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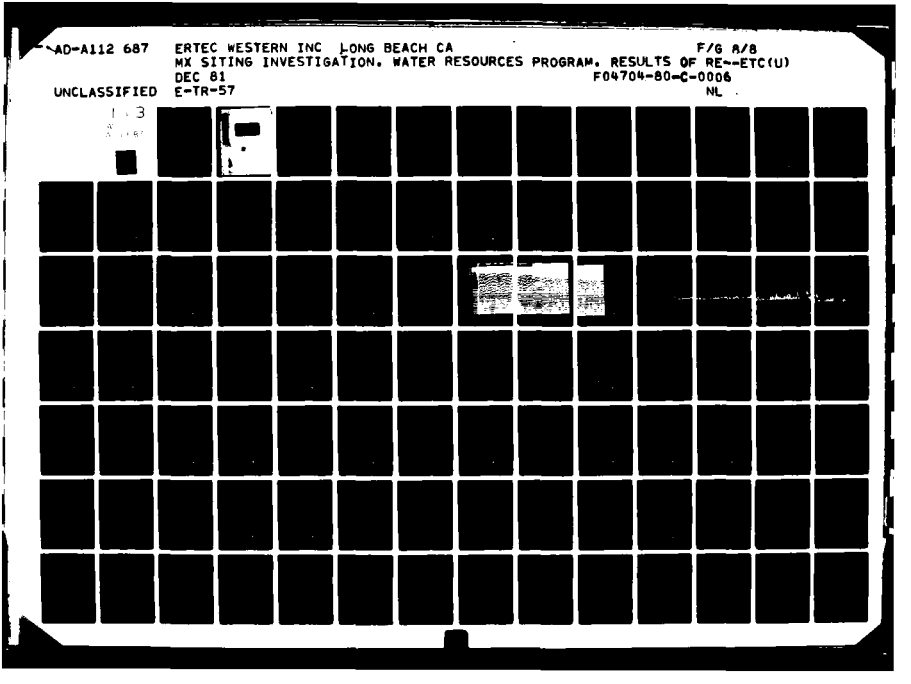

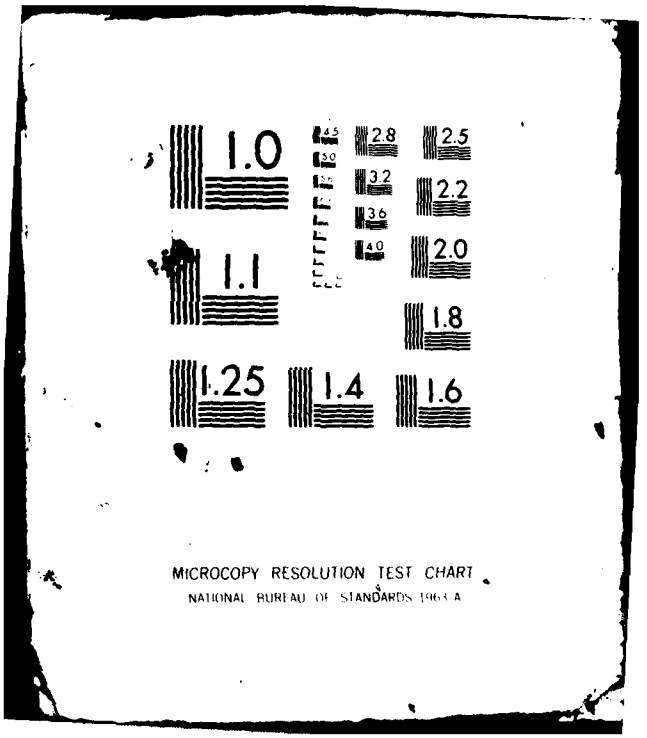
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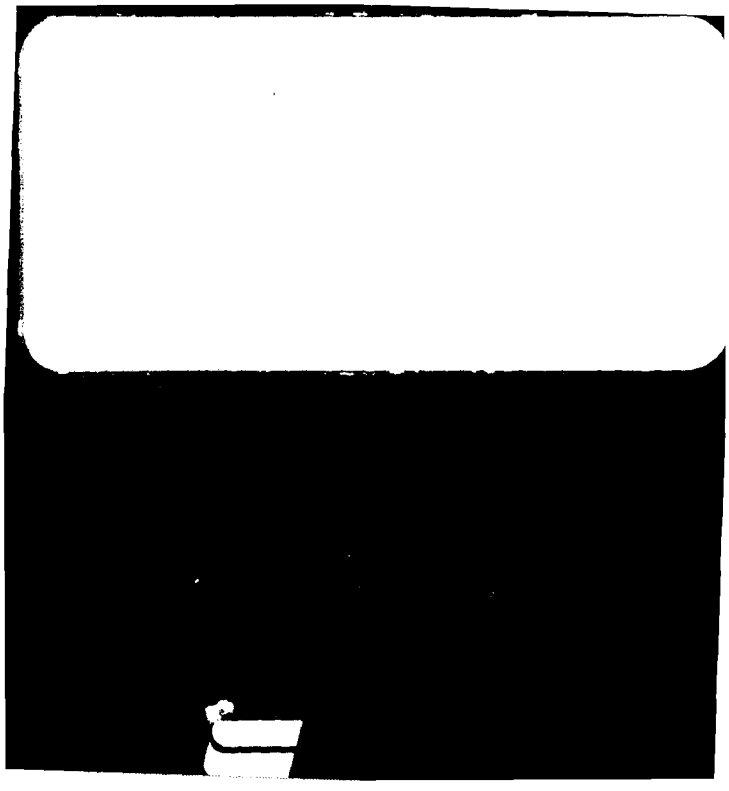

MX SITING INVESTIGATION
WATER RESOURCES PROGRAM
RESULTS OF REGIONAL CARBONATE AQUIFER TESTING
COYOTE SPRING VALLEY, NEVADA

Prepared for:

U.S. Department of the Air Force
Ballistic Missile Office
Norton Air Force Base, California 92409

Prepared by:

Ertec Western, Inc.
3777 Long Beach Boulevard
Long Beach, California 90807

18 December 1981

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Results of regional carbonate aquifer testing in Coyote Spring Valley, Nevada wells can be constructed in the aquifer to produced long term, sustained yields. The test well produced 3400 gpm continuously over a 30 day period of time. No impacts were detected in the regional springs of the Muddy Rivers Springs area.

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FOREWORD

This report was prepared for the U.S. Department of the Air Force, Ballistic Missile Office, in compliance with Contract No. F04704-80-C-0006. It presents partial results of Ertec Western's investigations of the water-supply potential of the regional carbonate aquifers in the proposed Nevada-Utah MX deployment area.

This report contains all data compiled during the drilling and testing of carbonate exploration well CE-DT-5 in Coyote Spring Valley, Nevada. Plans for additional testing of the carbonate aquifer in Coyote Spring Valley and further evaluation of the data compiled at CE-DT-5 were cancelled due to the President's decision not to implement the proposed MPS basing of the MX missile system in Nevada and Utah. Therefore, all conclusions and interpretations herein are considered preliminary.

A number of state, federal, and private agencies and individuals cooperated in the testing of CE-DT-5. Special acknowledgement is made to the Nevada Division of Water Resources who provided flumes and maintained recorders for one month after the completion of testing, the Nevada Power Company who provided observation well data through the Desert Research Institute, University of Nevada System; the U.S. Geological Survey, who performed water sampling and standard chemical and isotopic analyses; and to the individuals who gave permission for well and spring monitoring on privately owned land in upper Moapa Valley, Nevada.

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1.0 INTRODUCTION

Coyote Spring Valley was identified as a candidate location for the Main Operating Base (MOB) for the MX missile system in Nevada. In February 1980, Ertec, then Fugro National, initiated a water resources investigation in the valley as part of the U.S. Air Force's MX Water Resources Program. Data obtained from published literature and from Air Force test wells indicated that the valley-fill aquifer was incapable of supplying an adequate amount of water for construction and operation of the facility. Based on these results, studies to evaluate the water-supply potential of the regional carbonate aquifer were initiated. Regional geologic reconnaissance and exploratory drilling and testing of the regional carbonate aquifer in Coyote Spring Valley were begun on 20 November 1980. Results of subsequent drilling and testing conducted in 1981 are discussed in this report.

1.1 PURPOSE AND SCOPE

The purpose of this hydrologic investigation was to 1) evaluate the potential of the regional carbonate aquifer to supply water for the construction and operation of the proposed MOB; and 2) evaluate the impacts of ground-water withdrawals from the regional carbonate aquifer in Coyote Spring Valley on water users in the Muddy River Springs area.

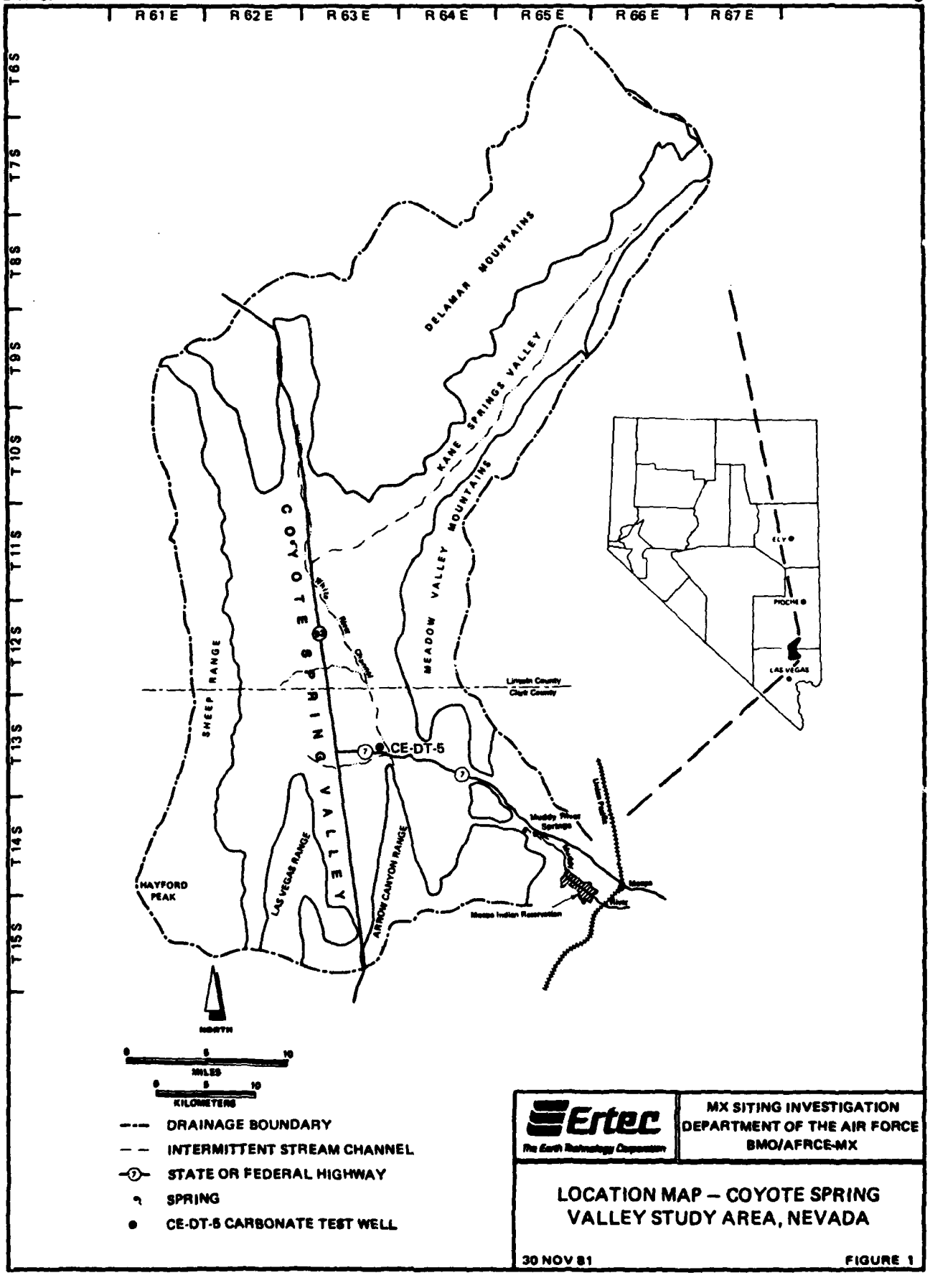
The scope of this investigation involved drilling and testing of a large diameter well (designated CE-DT-5) in the regional

carbonate aquifer in Coyote Spring Valley. One carbonate observation well (CE-DT-6) was also drilled in the valley during the 1981 program. Monitoring of carbonate and alluvial wells in Coyote Spring Valley and alluvial wells and regional springs in the upper Moapa Valley (Muddy River Springs area) during aquifer testing was an integral part of the program.

Results presented in this report are based upon previous investigations and Ertec analysis of data compiled during carbonate aquifer drilling and testing. This report does not constitute a complete appraisal of the regional carbonate aquifer system in Coyote Spring Valley but rather the results of a limited testing program in a selected area of the valley. Additional hydrologic studies would be required to fully characterize and evaluate the potential of the regional carbonate aquifer in Coyote Spring Valley as a long-term, water-supply source.

1.2 LOCATION AND GENERAL SITE CHARACTERISTICS

Figure 1 is a general location map of the Coyote Spring Valley study area. The CE-DT-5 well site is located along Nevada Highway 7 just west of the White River Channel (Pahranagat Wash) in Township 13 South, Range 63 East, southeast 1/4 of the southeast 1/4 of Section 23, M.D.M. (T13S/R63E-23dd). The study area includes all of Coyote Spring and Kane Springs valleys and the Muddy River Springs area (upper Moapa Valley). For a detailed discussion of the geography, geology, and basic hydrology of the area, the reader is referred to E-TR-51-I,



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LOCATION MAP – COYOTE SPRING VALLEY STUDY AREA, NEVADA

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FIGURE 1

Water Resources Program, Operational Base Studies Report, Volume I, Coyote Spring Operational Base, Nevada (Ertec, 1981).

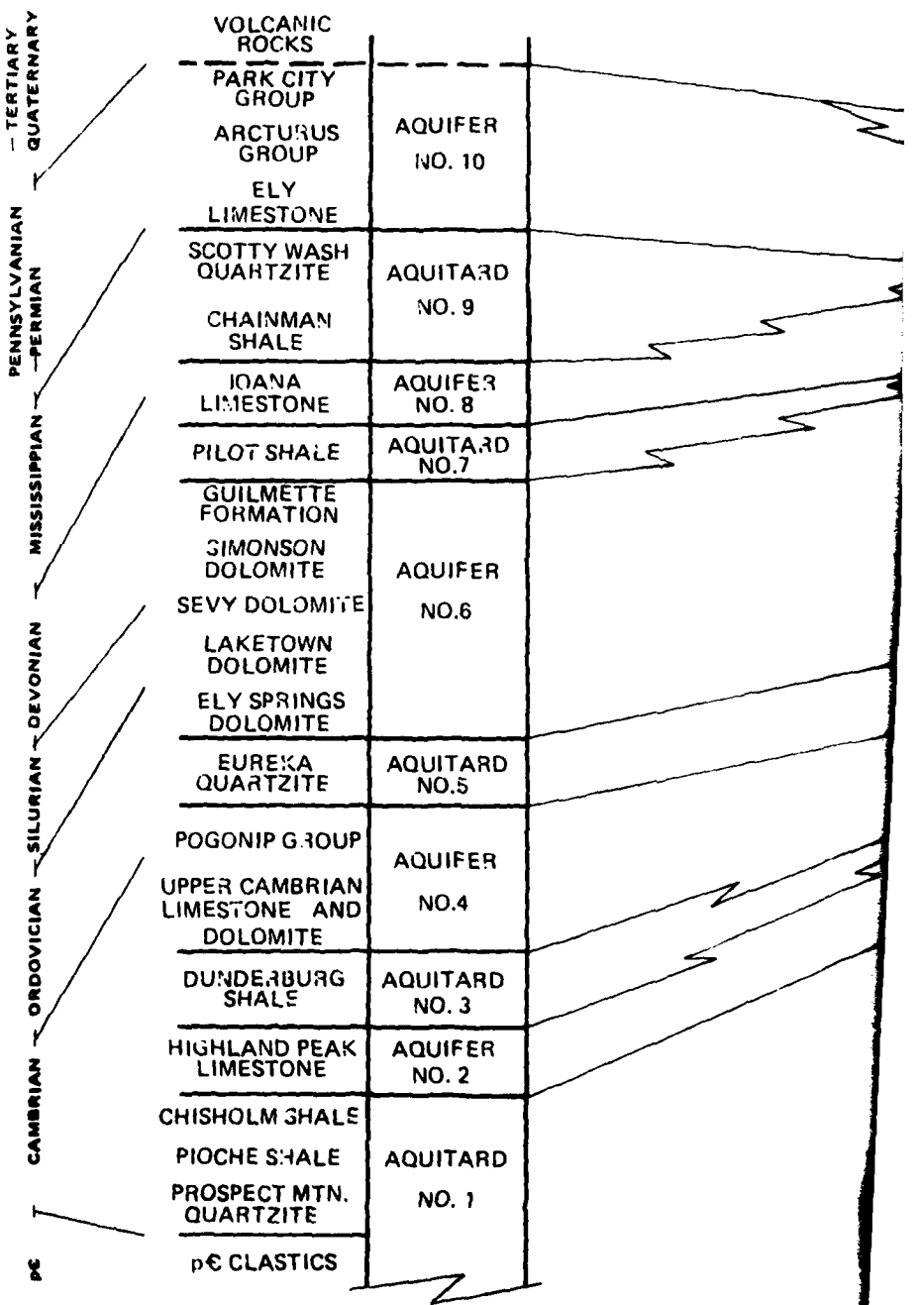
1.3 REGIONAL HYDROGEOLOGY

1.3.1 Carbonate Hydrostratigraphy

Prior to drilling and testing in Coyote Spring Valley, a regional survey of rock units of Paleozoic age was conducted throughout the MX deployment area. The purpose of this survey was to define the hydrostratigraphic characteristics of the Paleozoic section. Based upon the results of these studies, the Paleozoic stratigraphic section has been divided into 10 hydrostratigraphic units as shown in Figure 2. The areal extent of correlative units within the study area is shown in Drawing 1. A detailed description of each of these units is provided in Section 3.0 of E-TR-52, Water Resources Program, Technical Summary Report (Ertec, 1981).

Although a continuous Paleozoic section is not exposed within the study area, all the Paleozoic units are exposed as segmented fault blocks resulting from Basin and Range faulting. Due to depth considerations, only the upper and middle Paleozoic aquifer units were considered for initial testing. In the study area, these aquifer units include the Bird Springs Formation of Pennsylvannian age, the Monte Cristo Limestone of Mississipian age, and the Sultan Limestone of Upper Devonian age. In most of the study area, these aquifers form a continuous vertical sequence without the intervening aquitard

EAST - CENTRAL NEVADA



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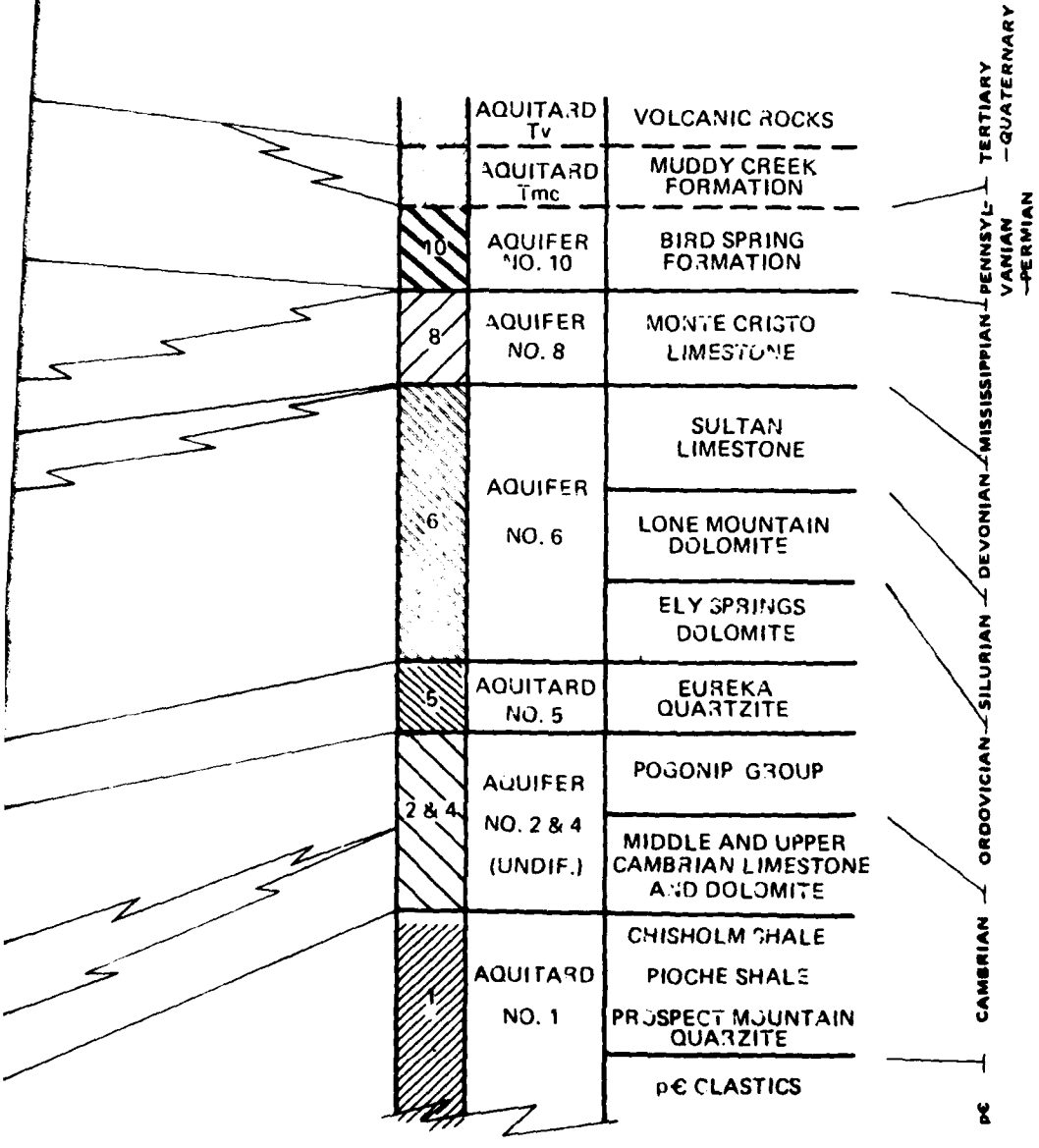

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CHART FOR EAST-CENTRAL NEVADA
AND COYOTE SPRING VALLEY

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FIGU

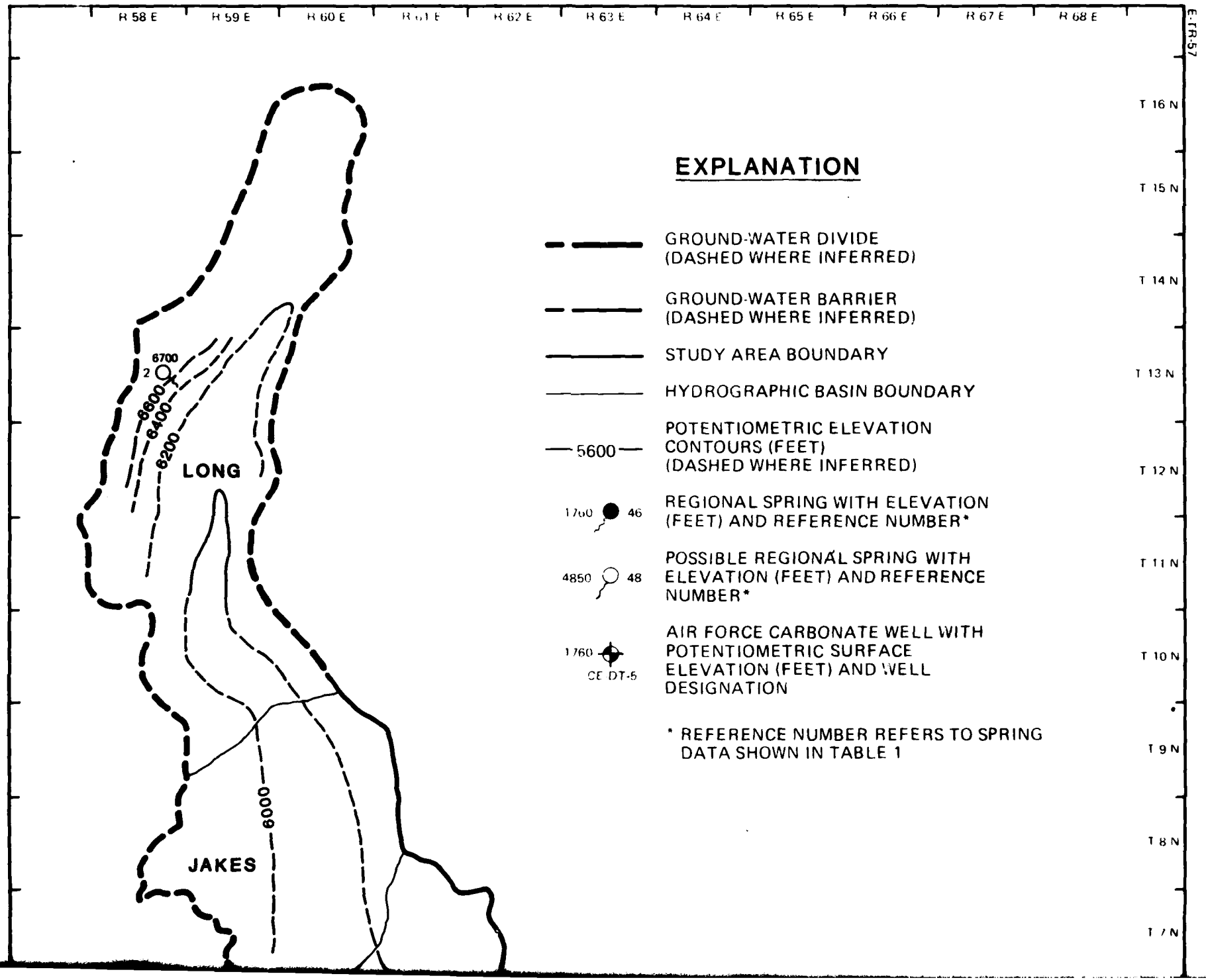
2

units which occur to the north. Only in northernmost Coyote Spring Valley does the Scotty Wash Quartzite and the Chainman Shale (aquitard No. 9) occur as a confining layer between the Mississippian and Pennsylvanian aquifers. The Scotty Wash Quartzite and Chainman Shale and the Pilot Shale (aquitard No. 7) have been reported to crop out on the eastern slopes of the Meadow Valley Mountains (Tschanz and Pampeyan, 1970) but are not believed to be present in the Paleozoic sequence underlying Coyote Spring Valley. According to Longwell and others (1979), neither of these aquitard units is present in Coyote Spring Valley south of T12S.

1.3.2 Regional Flow System

Many of the valleys in central and southern Nevada and west-central Utah are hydraulically connected via carbonate aquifers and form regional ground-water flow systems. The White River regional ground-water flow system, as defined by Eakin (1966), encompasses 13 hydrographic basins in central and southern Nevada and includes both Coyote Spring and Kane Springs valleys and the Muddy River Springs area.

The boundaries of the White River flow system and the inferred regional potentiometric surface are shown in Figure 3. Shown in Table 1 is a list of regional and possible regional springs in the White River flow system. The criteria used to define regional springs were based on water chemistry, temperature, and discharge rate. Possible regional springs are those which meet only two of the criteria standards established for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R 59 E
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R 63 E
R 64 E
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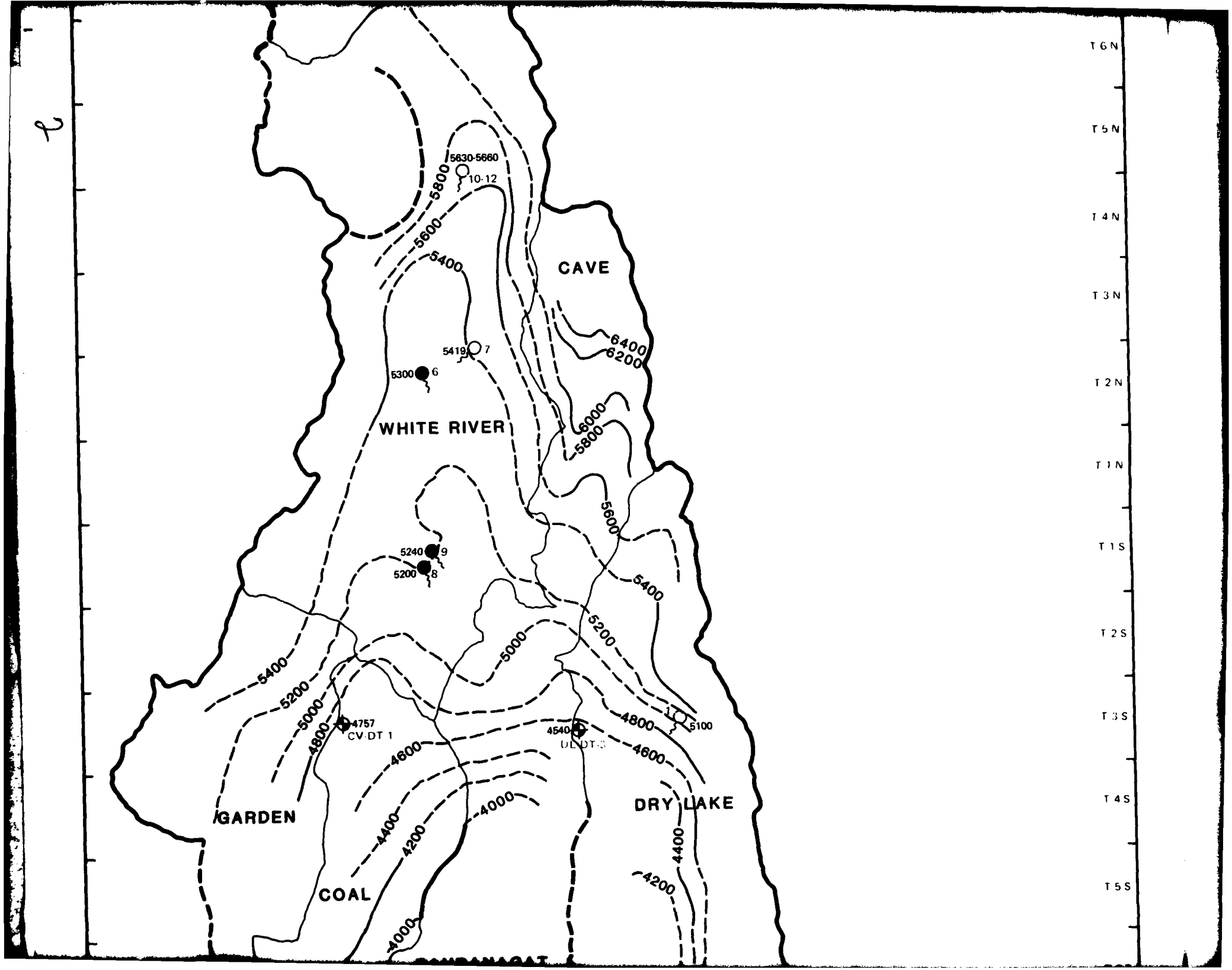
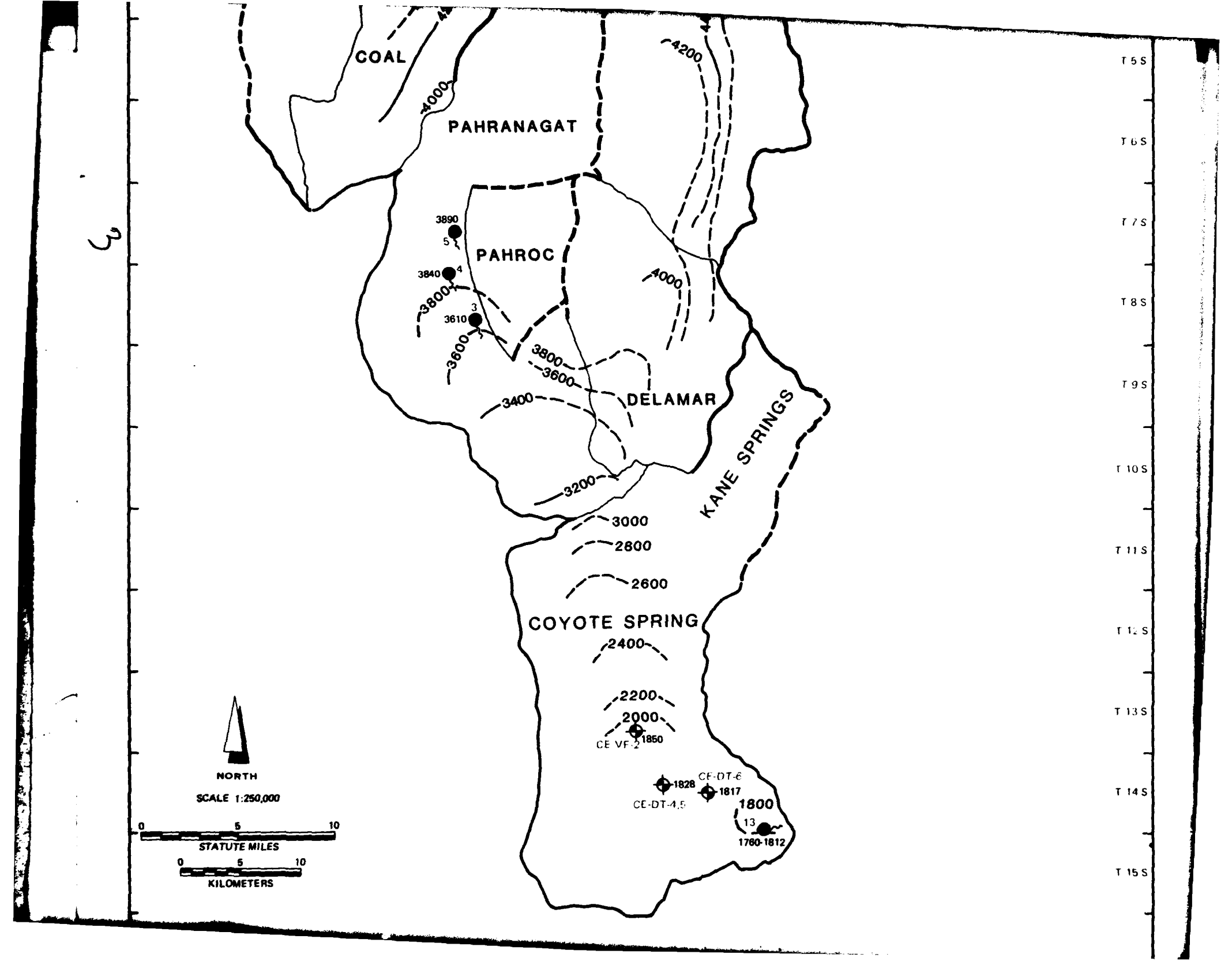
R 66 E
R 67 E
R 68 E
T 16 N
T 15 N
T 14 N
T 13 N
T 12 N
T 11 N
T 10 N
T 9 N
T 8 N
T 7 N
6700
2
6600
6400
6200
LONG
6000
JAKES
EXPLANATION
GROUND-WATER DIVIDE (DASHED WHERE INFERRED)
GROUND-WATER BARRIER (DASHED WHERE INFERRED)
STUDY AREA BOUNDARY
HYDROGRAPHIC BASIN BOUNDARY
5600
POTENTIOMETRIC ELEVATION CONTOURS (FEET) (DASHED WHERE INFERRED)
1760
46
REGIONAL SPRING WITH ELEVATION (FEET) AND REFERENCE NUMBER*
4850
48
POSSIBLE REGIONAL SPRING WITH ELEVATION (FEET) AND REFERENCE NUMBER*
1760
CE DT-5
AIR FORCE CARBONATE WELL WITH POTENTIOMETRIC SURFACE ELEVATION (FEET) AND WELL DESIGNATION
* REFERENCE NUMBER REFERS TO SPRING DATA SHOWN IN TABLE 1
E-TR-57


T6N
T5N
T4N
T3N
T2N
T1N
T1S
T2S
T3S
T4S
T5S
CAVE
WHITE RIVER
GARDEN
COAL
DRY LAKE
5630-5660
10-12
5419
7
5300
6
5240
9
5200
8
4757
CV-DT 1
4540
DL-DT-3
5100
6400
6200
6000
5800
5600
5400
5200
5000
4800
4600
4400
4200
4000


COAL
4000
PAHRANAGAT
4200
3890
5
PAHROC
3840
4
3800
3610
3
3600
4000
3800
3600
DELAMAR
3400
KANE SPRINGS
3200
3000
2800
2600
COYOTE SPRING
2400
2200
2000
1850
CE VF-2
1828
CE-DT-6
1817
CE-DT-4,5
1800
13
1760-1812
T 5 S
T 6 S
T 7 S
T 8 S
T 9 S
T 10 S
T 11 S
T 12 S
T 13 S
T 14 S
T 15 S
NORTH
SCALE 1:250,000
0 5 10
STATUTE MILES
0 5 10
KILOMETERS

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POTENTIOMETRIC SURFACE OF THE WHITE RIVER FLOW SYSTEM

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FIGURE 3

REFERENCE NUMBER*	SPRING	VALLEY	DISCHARGE (GPM)	TEMP (°C)	ELEVATION (FEET)	STATUS **
1	3N-65E-31cc	DRY LAKE	3	24	~5100	POSSIBLE REGIONAL
2	23N-58E-3bc	LONG	300	4	~6700	POSSIBLE REGIONAL
3	ASH SPRING	PAHRANAGAT	8700	32	3610	REGIONAL
4	CRYSTAL SPRING	PAHRANAGAT	3500	24	3840	REGIONAL
5	HIKO SPRING	PAHRANAGAT	4300	23	3890	REGIONAL
6	MORMON HOT SPRING	WHITE RIVER	1900	36	5300	REGIONAL
7	EMIGRANT SPRING	WHITE RIVER	1350	20	5419	POSSIBLE REGIONAL
8	MOON RIVER SPRING	WHITE RIVER	700	33	5200	REGIONAL
9	HOT CREEK SPRING	WHITE RIVER	6900	28	~5240	REGIONAL
10	COLD SPRING	WHITE RIVER	780	21	5660	POSSIBLE REGIONAL
11	NICHOLAS SPRING	WHITE RIVER	1125	22	5630	POSSIBLE REGIONAL
12	ARNOLD SPRING	WHITE RIVER	1380	22	5630	POSSIBLE REGIONAL
13	MUDDY RIVER SPRINGS AREA	MOAPA	15,770***	32	1760-1812	REGIONAL

*Site identification on figure 3

**Criteria for spring status discussed in Section 1.3.2

***Approximate summation of discharge for all springs in the area

REGIONAL AND POSSIBLE REGIONAL SPRINGS

TABLE 1

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regional spring status. A detailed description of the procedures and criteria used to identify these springs is contained in E-TR-52, Water Resources Program, Technical Summary Report (Ertec, 1981).

The boundaries of the flow system are based upon variations in physiography, ground-water-level elevations, geologic structures, and imbalances in valley water budgets. Thick Paleozoic carbonate sequences underlie the valley-fill aquifers and occur in most of the bounding mountain ranges. Where faulted or fractured, secondary dissolution has greatly increased the ability of the carbonates to store and transmit ground water. Ground water which originates as precipitation in the mountainous areas is transmitted through the fracture and fault systems to discharge areas such as springs or evapotranspiration zones. Most of this ground-water flow is presumed to occur along the axis of the system through White River, Pahranagat, and Coyote Spring valleys (Eakin, 1966).

Recharge from precipitation is significantly less than regional underflow to and discharge from the southern portion of the White River flow system (Coyote Spring and Kane Springs valleys and the Muddy River Springs area). Eakin (1964) estimated that some 35,000 acre-ft/yr (43.12 hm^3/yr) of underflow enter Coyote Spring Valley from Pahranagat Valley and that recharge from precipitation to Coyote Spring and Kane Springs valleys totals only 2600 acre-ft/yr (3.2 hm^3/yr). Discharge from the system totals a few hundred acre-ft/yr via evapotranspiration in

Coyote Spring Valley and approximately 36,000 acre-ft/yr (44.4 hm^3/yr) of spring discharge at Muddy River Springs, the presumed terminal point of the regional flow system.

The potentiometric surface in the southern part of the flow system slopes southward and then eastward from about 3200 feet (975 m) in elevation at the northern end of Coyote Spring Valley to about 1800 feet (549 m) in the Muddy River Springs area. The elevation of spring discharge in the Muddy River Springs area ranges from 1760 to 1812 feet (536 to 552 m). The occurrence of these springs appears to be related to faulting which forms discontinuities and probably conduits in the carbonate aquifers.

2.0 DRILLING PROGRAM

2.1 SITE SELECTION

Selection of the well site for CE-DT-5 was based on geologic and hydrologic information obtained during drilling and limited testing of an initial carbonate exploration well, CE-DT-4, which was drilled in November 1980. The well site for CE-DT-5 is located 330 feet (100 m) east of CE-DT-4 which provided a nearby observation point for aquifer testing.

Several cultural and hydrogeologic criteria were considered in initial selection of the CE-DT-4- and 5 drill site. These included land ownership and use, avoidance of existing water rights or known wells and springs, site access, carbonate hydrostratigraphy, geologic structure, thickness of alluvial cover, and projected depth to target hydrostratigraphic units. A detailed discussion of these criteria is provided in Appendix A1.1. Reconnaissance geologic mapping and a seismic refraction survey were performed to verify site conditions.

2.2 SITE GEOLOGY

The CE-DT-4- and 5 site is situated in the southeast portion of Coyote Spring Valley within a topographic low known as Starvation Flat. Surficial deposits in the vicinity consist of semi-consolidated clays of the Muddy Creek Formation of Tertiary age and unconsolidated silty sand, sand, and gravel of Quaternary age. Approximately 400 feet (122 m) west of the site, a highly folded and faulted block of cherty, siliceous, fossiliferous limestone crops out. Based on the lithologic character of the

block, it has been identified as Anchor Member of the Monte Cristo Limestone of Lower Mississippian age.

The prominent Arrow Canyon Range lies to the south of the site. This range is an uplifted fault-block of mostly carbonate rocks ranging in age from Ordovician to Mississippian. The range is a broad syncline that plunges north-northwest. The northern tip of the range plunges beneath alluvium approximately 800 feet (284 m) south of the well site. Rocks exposed at the northern tip of the range are of the Anchor Member of the Mississippian Monte Cristo Limestone. This formation has been included in hydrostratigraphic aquifer unit No. 8 as described in the preceding section of this report. Near the alluvial bedrock contact, the Anchor member is cut by numerous faults, most of which trend northwest.

2.3 DRILLING

Drilling of CE-DT-5 commenced on 13 April 1981 using a trailer-mounted Gardner Denver 2500 mud rotary rig. A 26-inch- (66-cm) diameter borehole was drilled through the alluvial cover and 5 feet (1.5 m) into competent carbonate bedrock to a total depth of 126 feet (38 m). Twenty-inch (51-cm) outside diameter surface casing was installed to this depth and pressure-grouted in place.

All subsequent drilling was with 17.5-inch (44.5-cm) diameter bits. Loss of circulation of drilling fluid occurred frequently. A significant zone of lost circulation was encountered at

387 feet (118 m). This zone was found to be dry and was cemented off and drilling proceeded.

The first recognized water occurred between 410 and 450 feet (125 and 137 m). A second zone of significant circulation loss was encountered at 571 feet (174 m). Drilling continued at a slow rate, and circulation could not be regained. Drilling was terminated on 6 May 1981 at a depth of 628 feet (191 m) because the continued circulation loss suggested that significant saturated fracture(s) had been penetrated.

During drilling, lithologic samples were collected at 5-foot (1.5-m) intervals, at apparent formation changes, and whenever changes were observed in drilling conditions. A detailed chronology of drilling activities and a description of the bit and drilling fluid programs are provided in Appendix A1.2. Upon completion of drilling, spontaneous potential, resistivity, natural gamma, 3-D velocity, and 3-diameter caliper geophysical logs were run in the borehole. In addition, video logs were run in both CE-DT-4 and 5. Results of logging are discussed in the following section.

2.4 SUBSURFACE CONDITIONS

Based upon surface correlation and subsurface geophysical information obtained and drill chip cuttings collected, CE-DT-5 penetrated the lowermost 500 feet (152 m) of the Anchor Member of the Monte Cristo Limestone. Although no samples were obtained during the last 57 feet (17 m) of drilling due to loss of circulation, correlation with lithologic unit thicknesses

'n CE-DT-4 suggest that CE-DT-5 was completed 18 feet (5.5 m) into the Dawn Member of the Monte Cristo Limestone. Lithologic, geophysical, and well design logs for CE-DT-4 and 5 are shown in Figures 4 and 5.

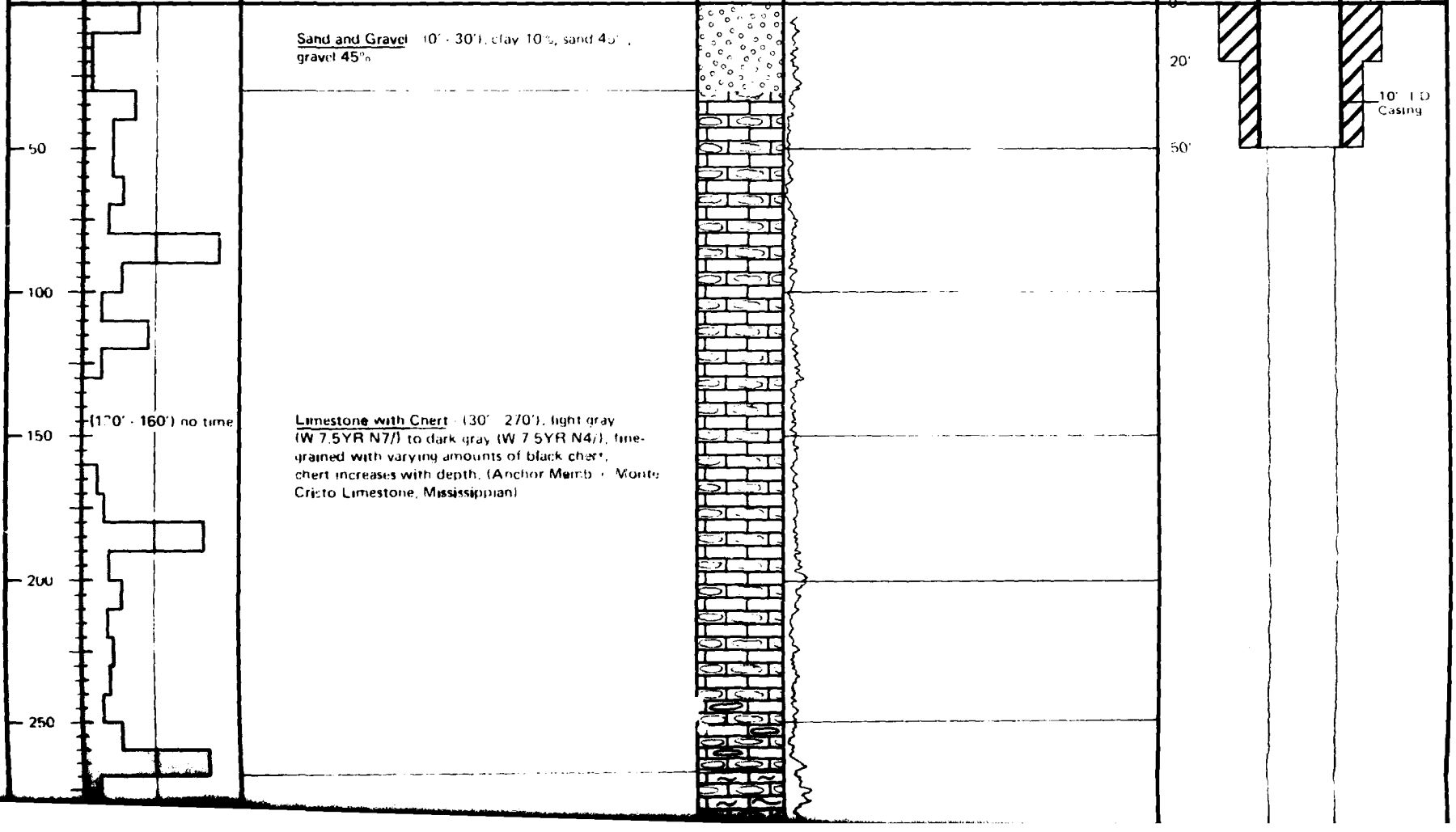
Lithologically, the Anchor Member consists of thin to medium-bedded, fossiliferous, cherty and/or siliceous, fine- to medium-grained limestone. The underlying Dawn Member is characterized by a medium-bedded, fine- to medium-grained limestone. The contact between the two members is generally sharp and conformable.

Intercrystalline porosity and permeability of each member is negligible, however, secondary permeability due to faulting and fracturing is generally well developed, especially within the Anchor Member. This increased fracturing is probably due to the more brittle response of the siliceous and cherty portions during deformation. Due to the insoluable nature of the siliceous and cherty portions, the degree of interconnection of small fractures is probably minimal. In contrast, interconnecting fractures within the Dawn Member appears more likely due to the lack of insoluable material.

The extent of fracturing as well as the shape of the fractures were identified by use of a videolog, 6-arm caliper log, and the 3-D velocity log. The videolog was run in both CE-DT-4 and 5, however, due to the lack of well development of CE-DT-5 at the time of logging, the water was too murky to provide

COYOTE SPRING VALLEY OBSERVATION WELL (CE-DT-4) 13S/63E-23dd1

Depth	Penetration Rate	Lithologic Log		Geophysical Logs	Well Design
Ft.	1"= 400 Min.	Description	Symbol	Gamma S.P. Res.	



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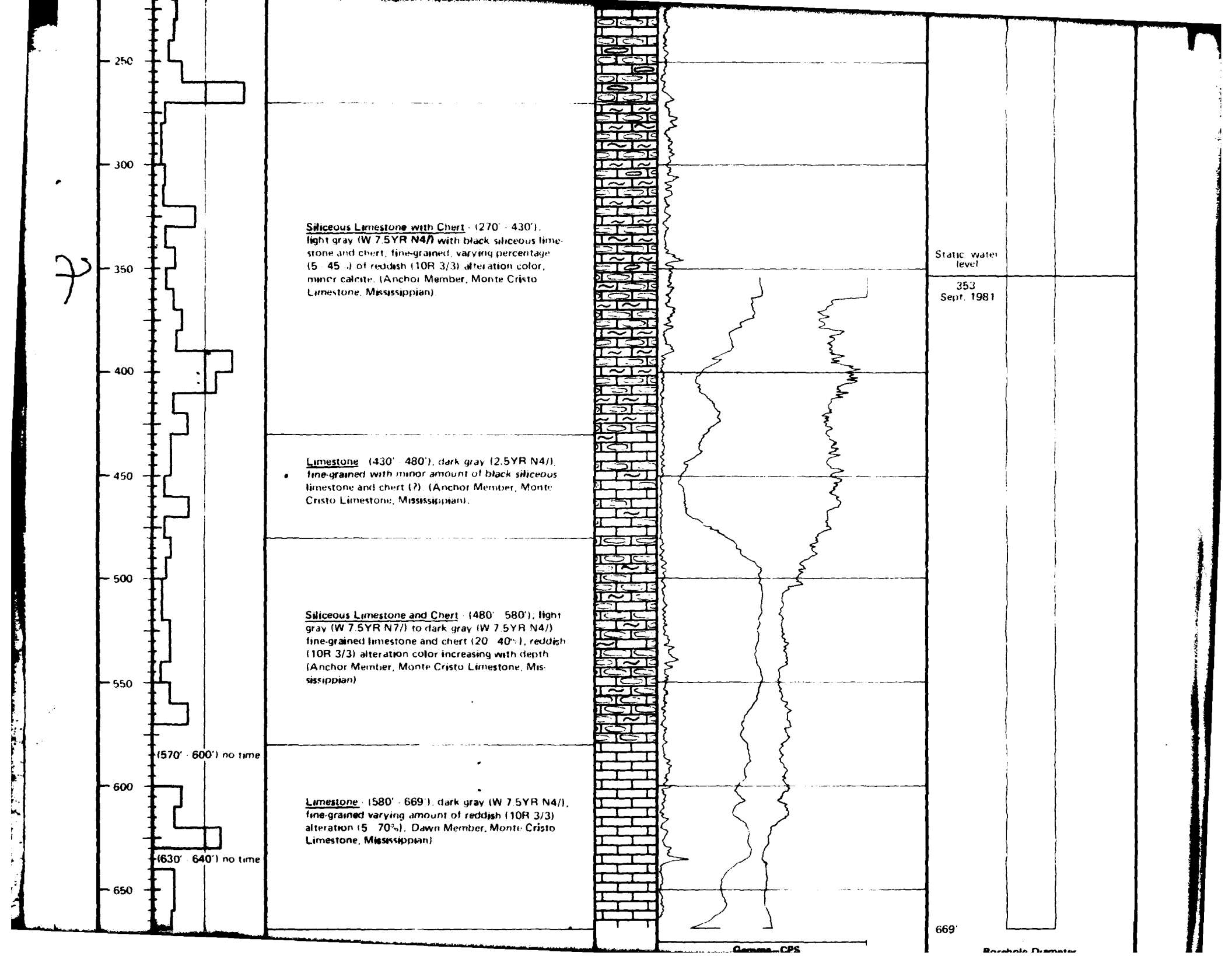
250
300
350
400
450
500
550
600
650
Siliceous Limestone with Chert - (270' - 430'), light gray (W 7.5YR N4/) with black siliceous limestone and chert, fine-grained, varying percentage (5 - 45 %) of reddish (10R 3/3) alteration color, minor calcite. (Anchor Member, Monte Cristo Limestone, Mississippian)
Limestone - (430' - 480'), dark gray (2.5YR N4/), fine-grained with minor amount of black siliceous limestone and chert (?). (Anchor Member, Monte Cristo Limestone, Mississippian).
Siliceous Limestone and Chert - (480' - 580'), light gray (W 7.5YR N7/) to dark gray (W 7.5YR N4/) fine-grained limestone and chert (20 - 40%), reddish (10R 3/3) alteration color increasing with depth (Anchor Member, Monte Cristo Limestone, Mississippian)
(570' - 600') no time
Limestone - (580' - 669'), dark gray (W 7.5YR N4/), fine-grained varying amount of reddish (10R 3/3) alteration (5 - 70%). Dawn Member, Monte Cristo Limestone, Mississippian)
(630' - 640') no time
Static water level
353
Sept. 1981
669'
Gamma--CPS
Borehole Diameter

WELL DESIGN

LITHOLOGIC SYMBOLS

Sand with Gravel
Silt and Sand with Gravel
Silty Sand with Gravel
(May also include the modifier *and gravel*).

Limestone

Limestone with chert

Cherty Limestone

Siliceous Limestone

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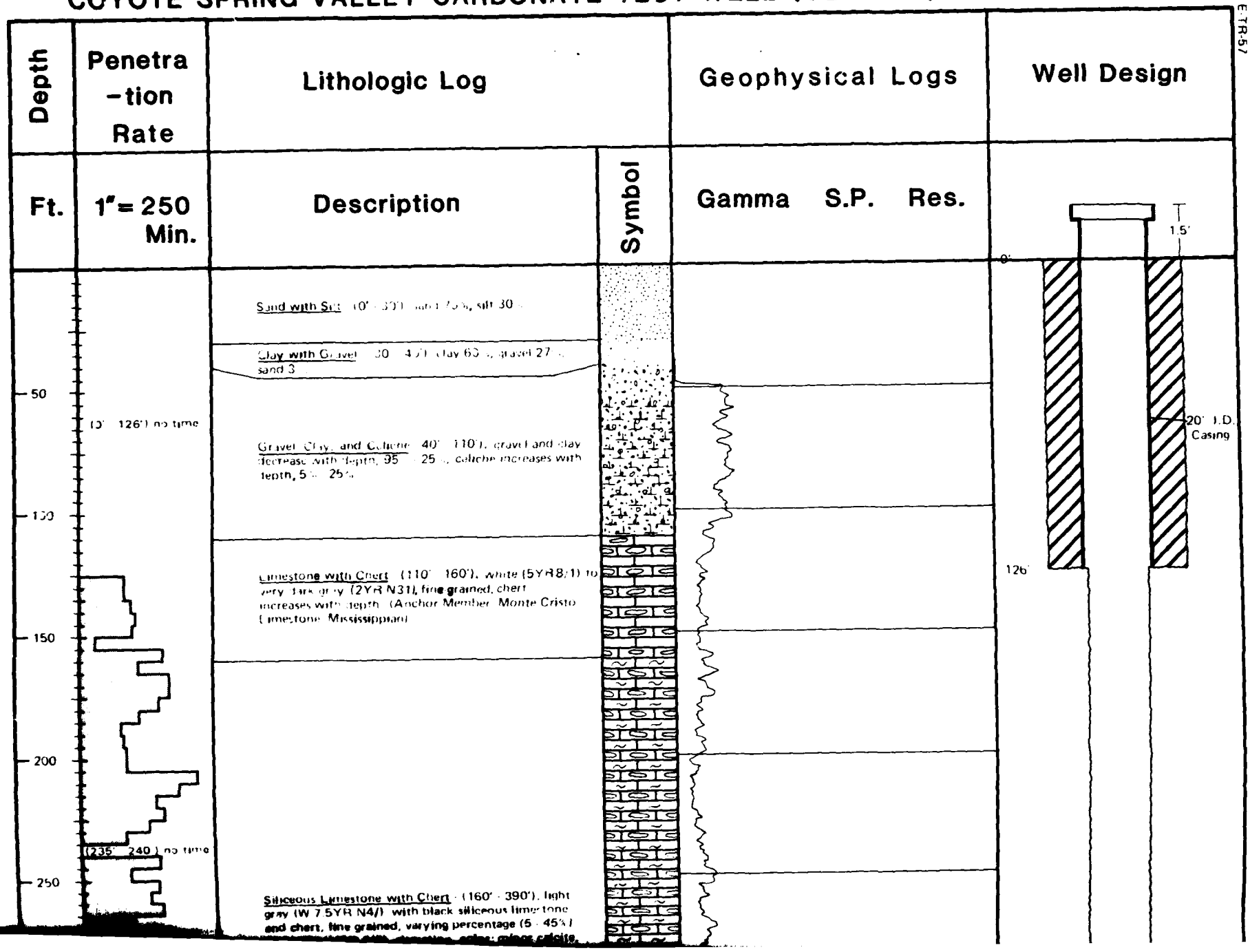
LITHOLOGIC LOG AND WELL COMPLETION SUMMARY
CE-DT-4

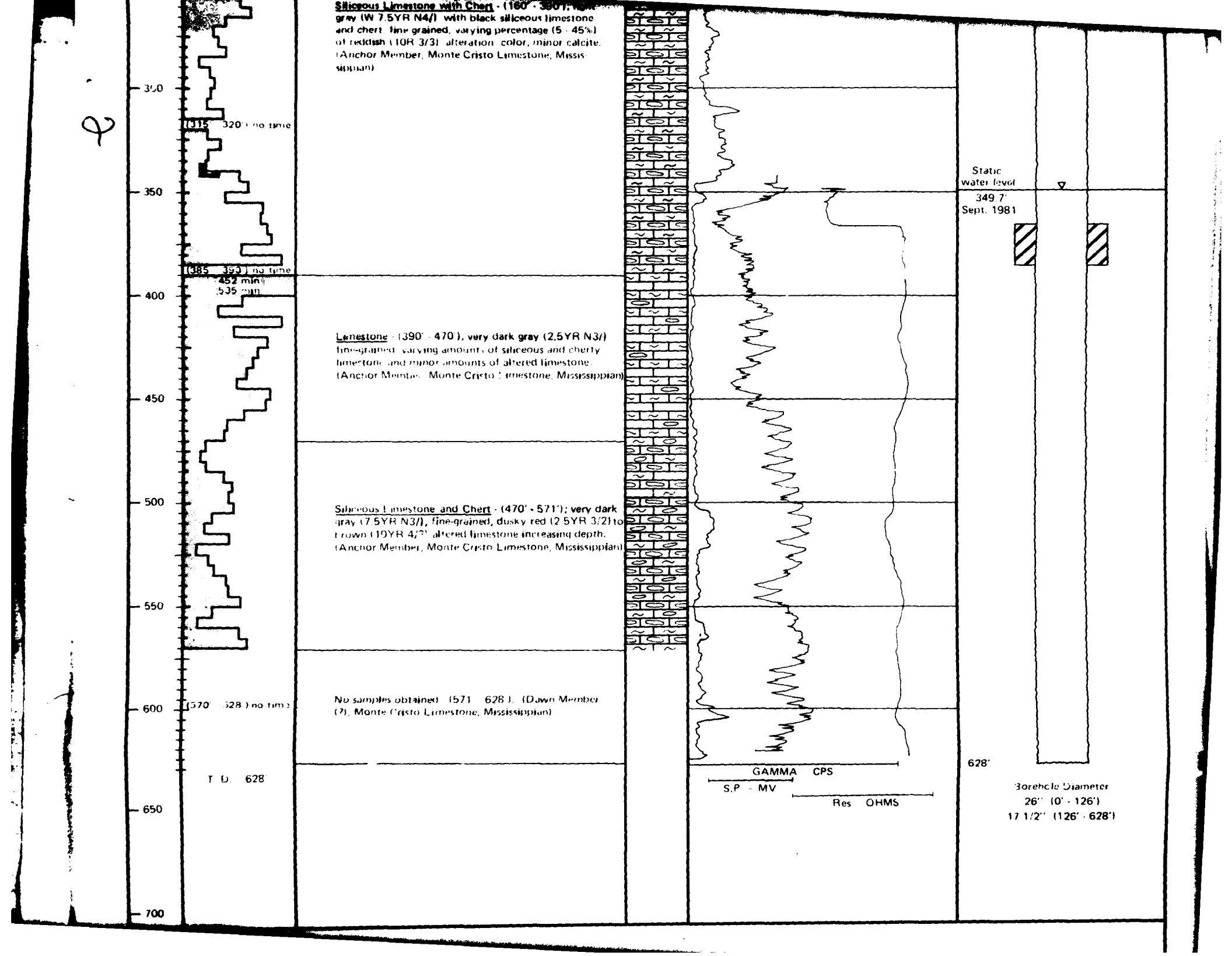
20 NOV 81

FIGURE 4

3

COYOTE SPRING VALLEY CARBONATE TEST WELL (CE-DT-5) 13S/63E-23dd2




Siliceous Limestone with Chert - (160' - 390'); light gray (W 7.5YR N4/) with black siliceous limestone and chert, fine grained, varying percentage (5 - 45%) of reddish (10R 3/3) alteration color, minor calcite. (Anchor Member, Monte Cristo Limestone, Mississippian)
Limestone - (390' - 470'), very dark gray (2.5YR N3/) fine-grained, varying amounts of siliceous and cherty limestone and minor amounts of altered limestone. (Anchor Member, Monte Cristo Limestone, Mississippian)
Siliceous Limestone and Chert - (470' - 571'); very dark gray (7.5YR N3/), fine-grained, dusky red (2.5YR 3/2) to brown (10YR 4/3) altered limestone increasing depth. (Anchor Member, Monte Cristo Limestone, Mississippian)
No samples obtained (571' - 628'). (Dawn Member (?), Monte Cristo Limestone, Mississippian)
(315' - 320') no time
(385' - 390') no time
452 min
535 min
(570' - 628') no time
T.D. 628'
300
350
400
450
500
550
600
650
700
GAMMA CPS
S.P. - MV
Res OHMS
Static water level
349.7'
Sept. 1981
628'
Borehole Diameter
26" (0' - 126')
17 1/2" (126' - 628')

WELL DESIGN

Cement

LITHOLOGIC SYMBOLS

- Sand / Silty Sand
- Clay with Gravel / Clay Silt with Gravel / Silt with Gravel / Silty Clay with Gravel
- Limestone / Altered Limestone
- Limestone with Chert
- Cherty Limestone
- Siliceous Limestone
- Caliche

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LITHOLOGIC LOG AND WELL COMPLETION SUMMARY
CE-DT-5

30 NOV 81

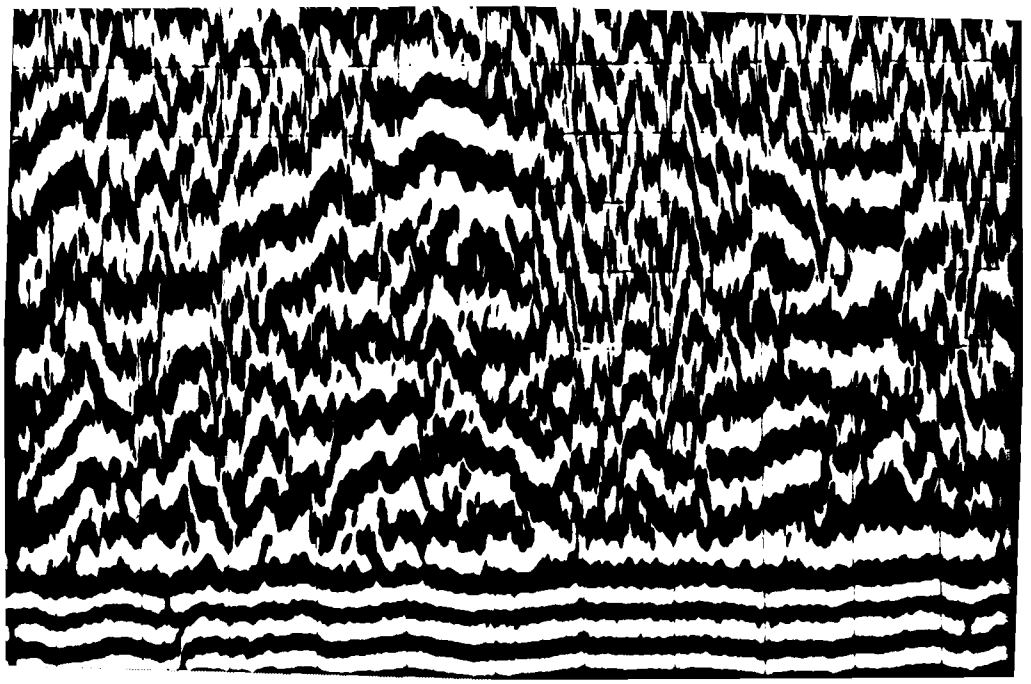
FIGURE 5

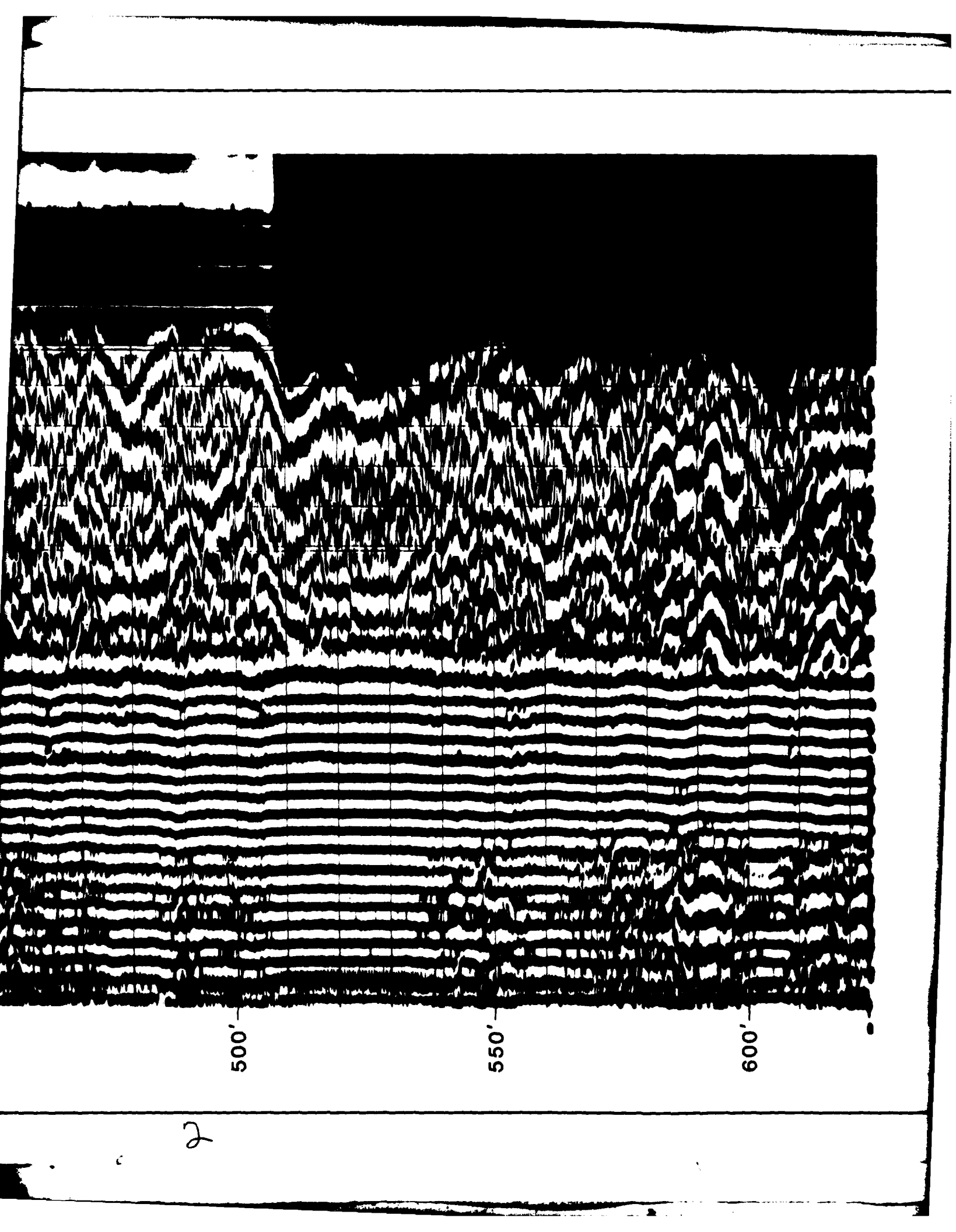
3

adequate analysis of fracturing below the static water level. Fracture data for CE-DT-5 from analysis of the 3-D velocity log, shown in Figure 6, indicate predominantly oblique fractures due to the attenuation of both the shear (s) and compression (p) waves. Major zones of fracturing of this type occur at 420 to 425 feet (128 to 130 m), 490 to 500 feet (150 to 152 m), 560 to 565 feet (171 to 172 m), 570 to 580 feet (174 to 177 m), and 600 to 610 feet (183 to 186 m). A zone from 510 to 540 feet (155 to 165 m) shows some attenuation of the p wave and a significant attenuation of the s wave. This is believed to indicate a major zone of predominantly horizontal fractures. The 3-D velocity and the 3-diameter caliper log (Figure 7) are generally in close agreement in showing the degree of fracture density. In CE-DT-4, the videolog shows that most of the fractures are near vertical, some of which are approximately 4 to 5 inches (10 to 13 cm) wide.

To assist in the determination of aquifer mechanics, a fracture density analysis was performed for each well videolog. Fractures were counted for each 5-foot (1.5-m) interval and graphs prepared of the number of fractures versus depth (Figures 8 and 9). Less fractured zones occur in fine-grained, cherty limestone units and the highly fractured zones correlated with siliceous and unaltered limestone units. There does not appear to be any decrease in fracture density with depth.

The videolog of CE-DT-4 indicates that the highest fracture density occurs in the presumed water producing zone between 580





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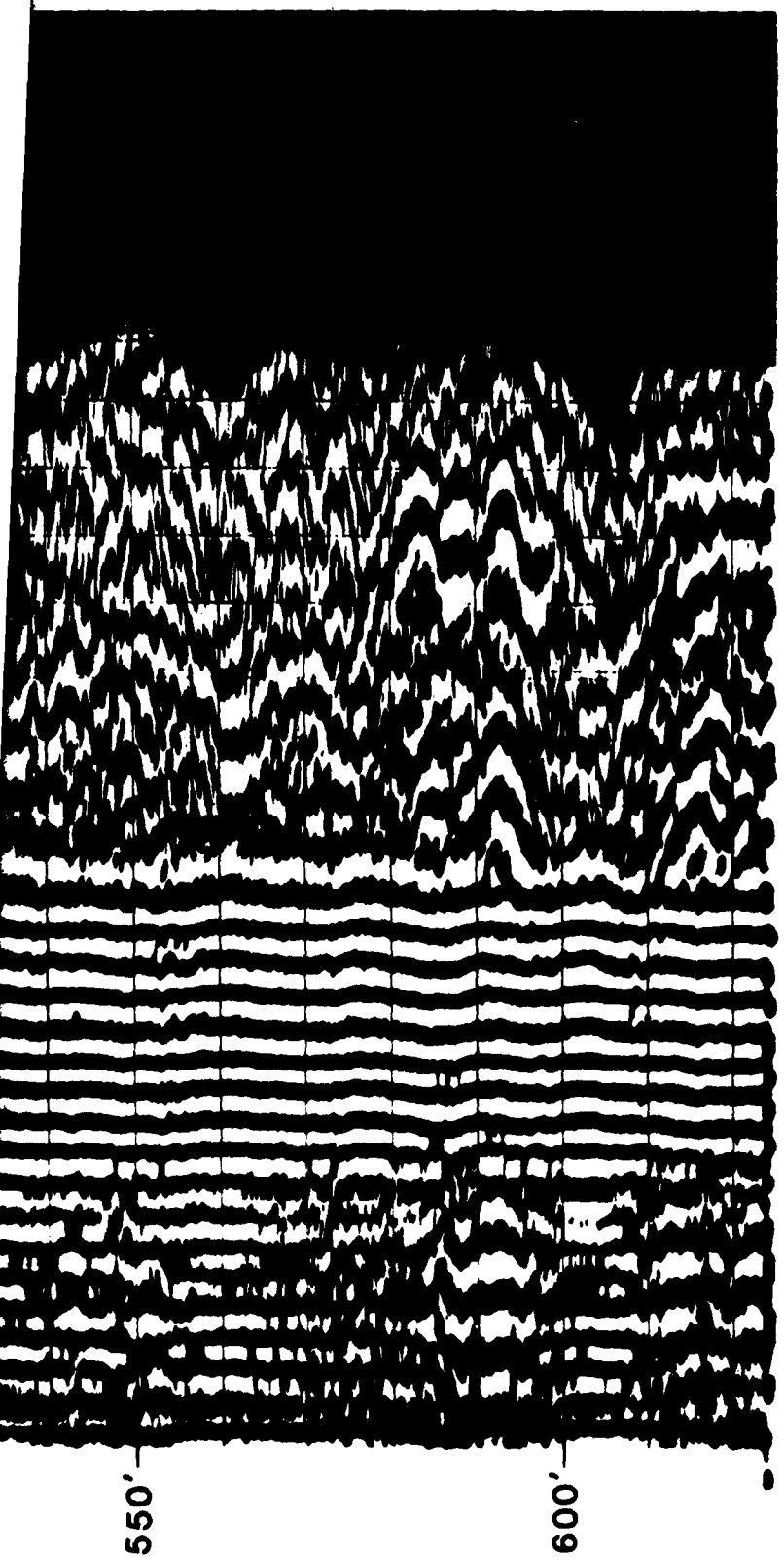

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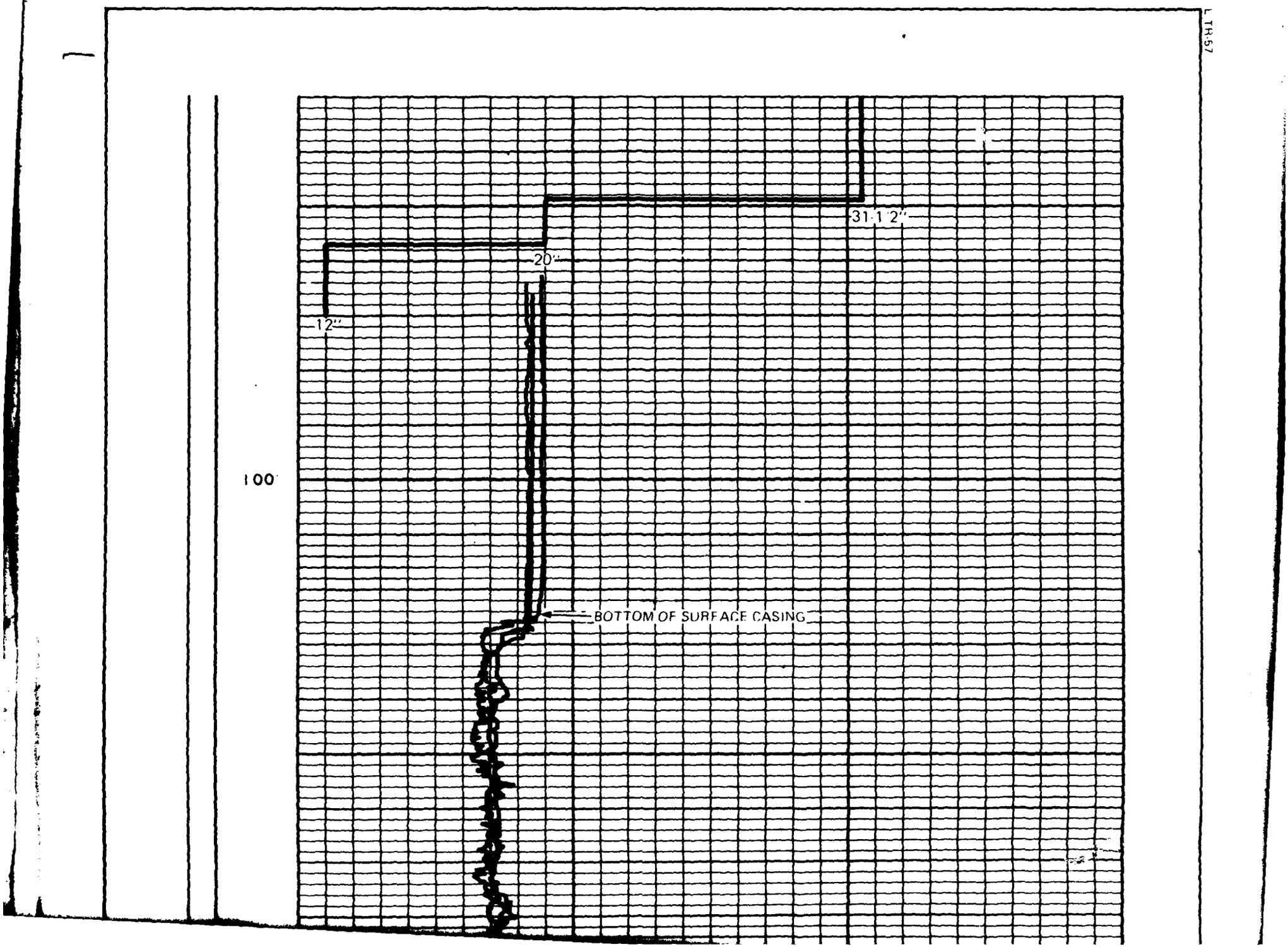
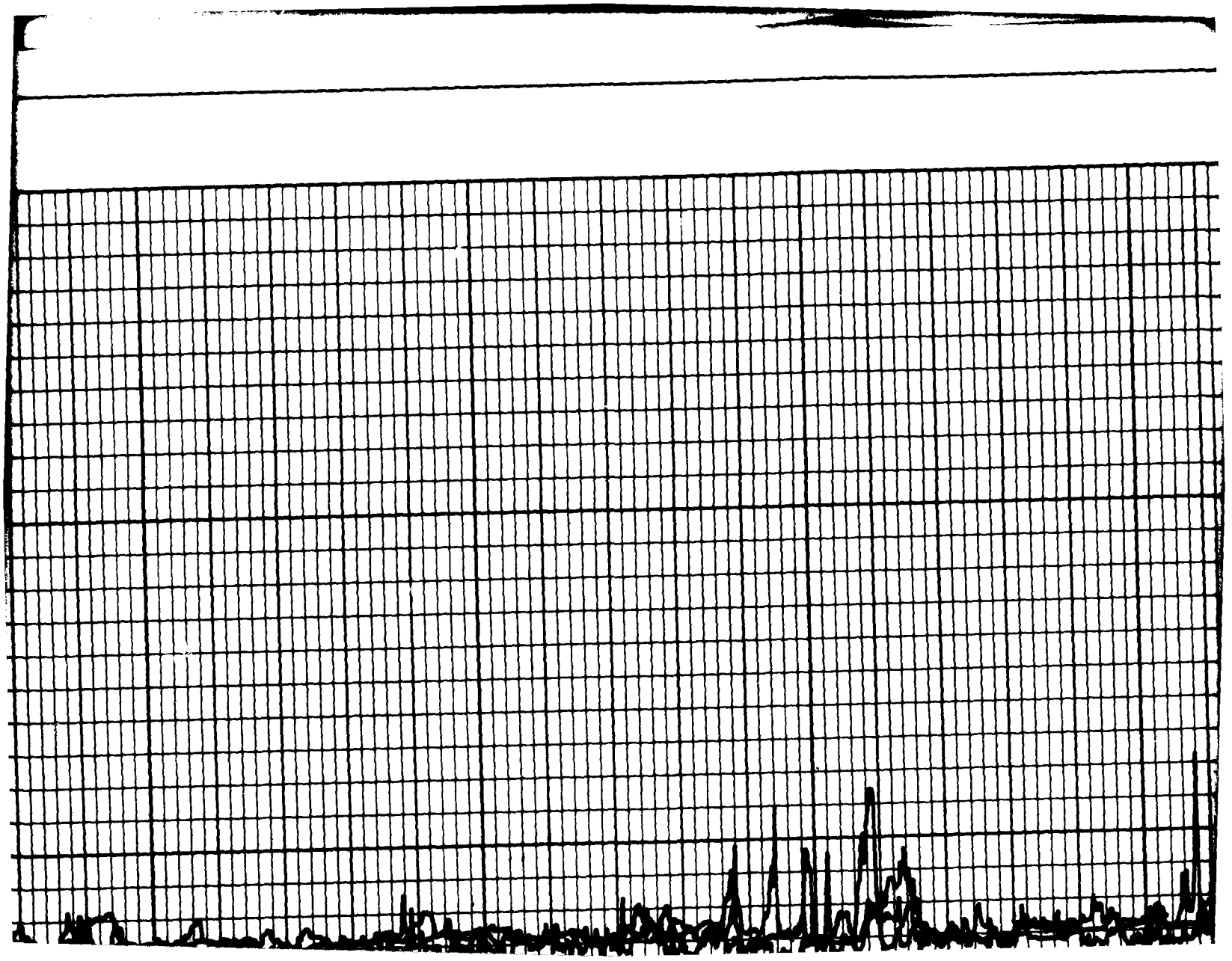
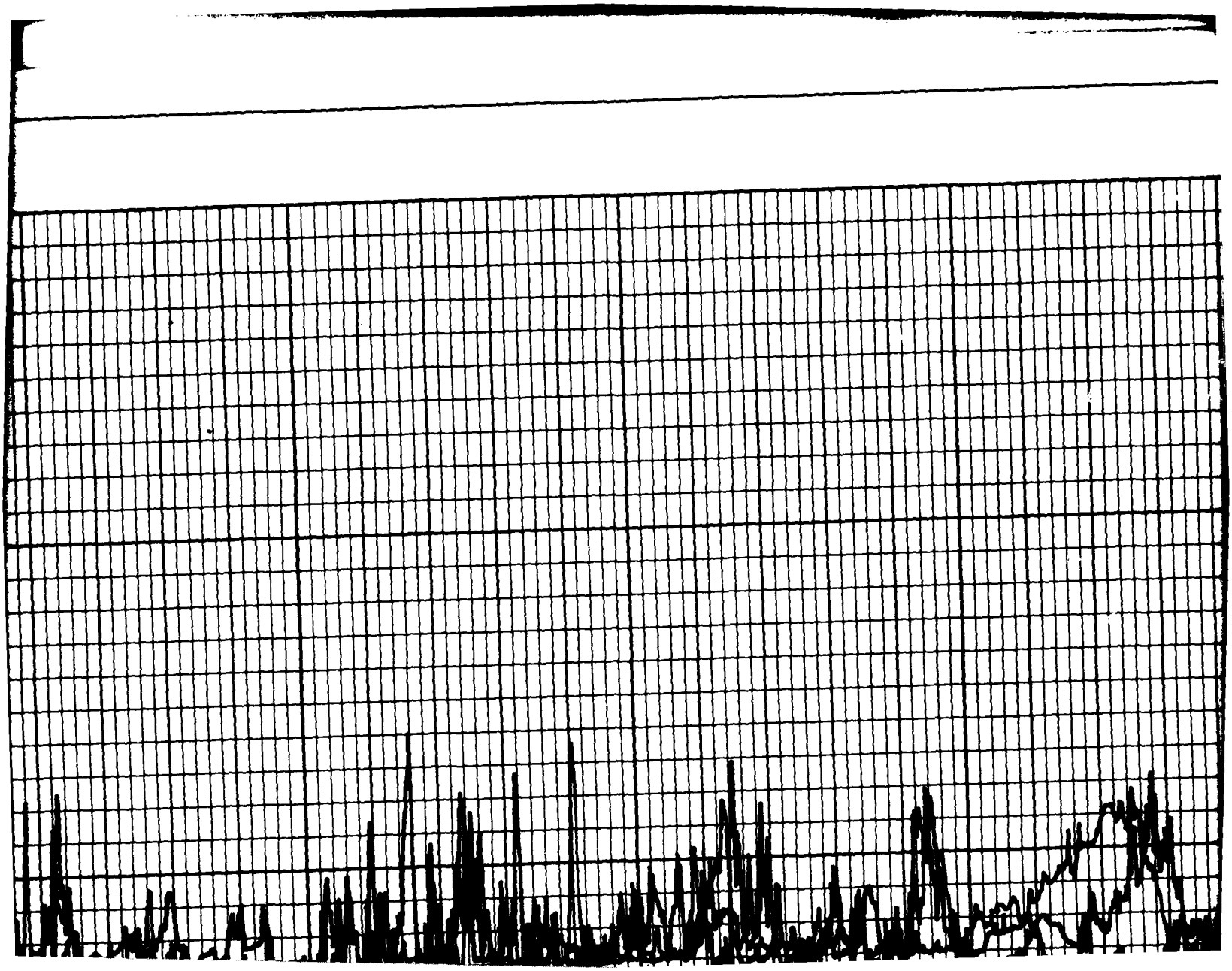
3-D VELOCITY LOG (6' SPACING)
CE-DT-5

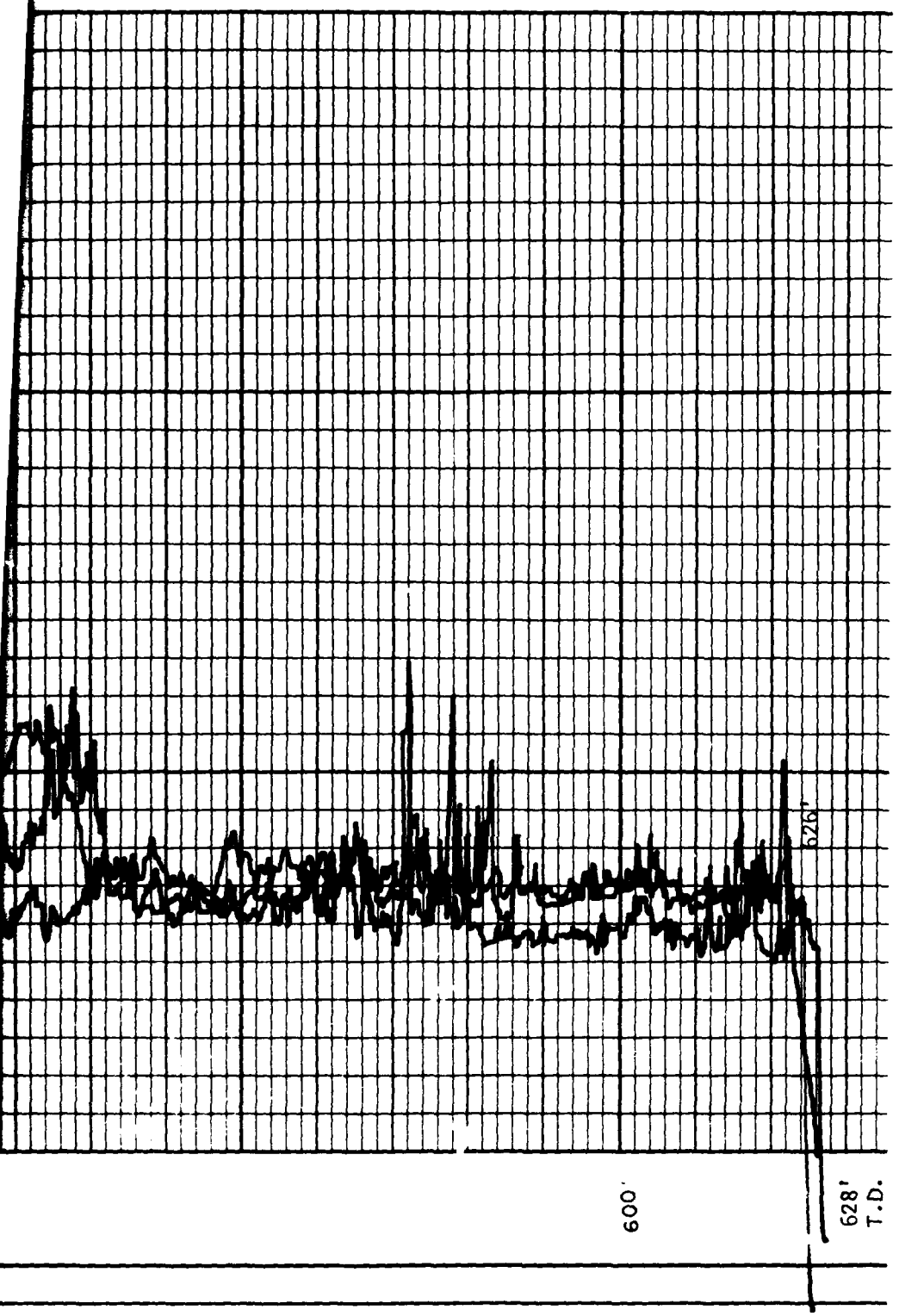
30 NOV 81

FIGURE 6


31-1 2"
20"
12"
100'
BOTTOM OF SURFACE CASING







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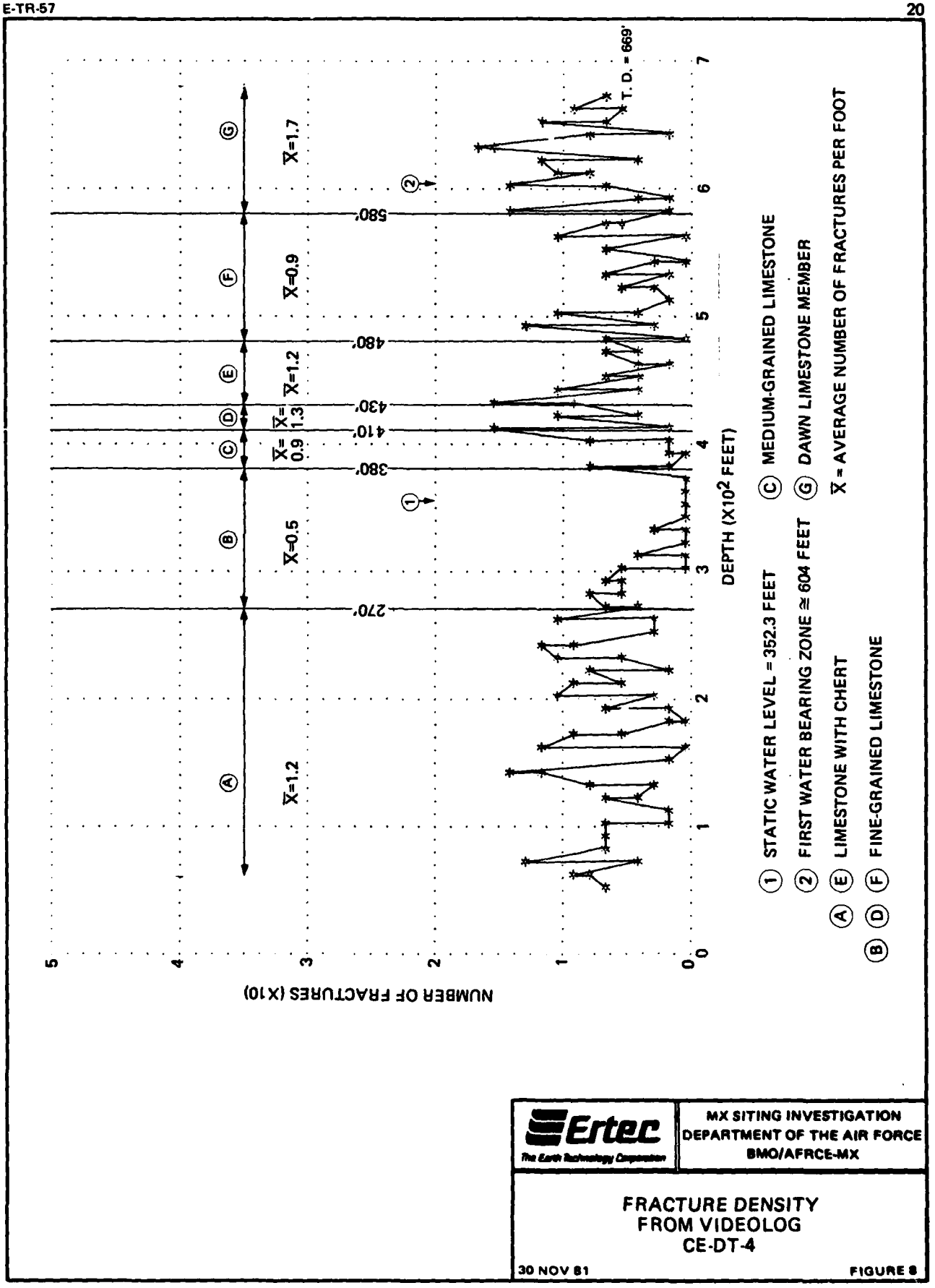
3 - DIAMETER CALIPER LOG
CE-DT-5

30 NOV 81

FIG



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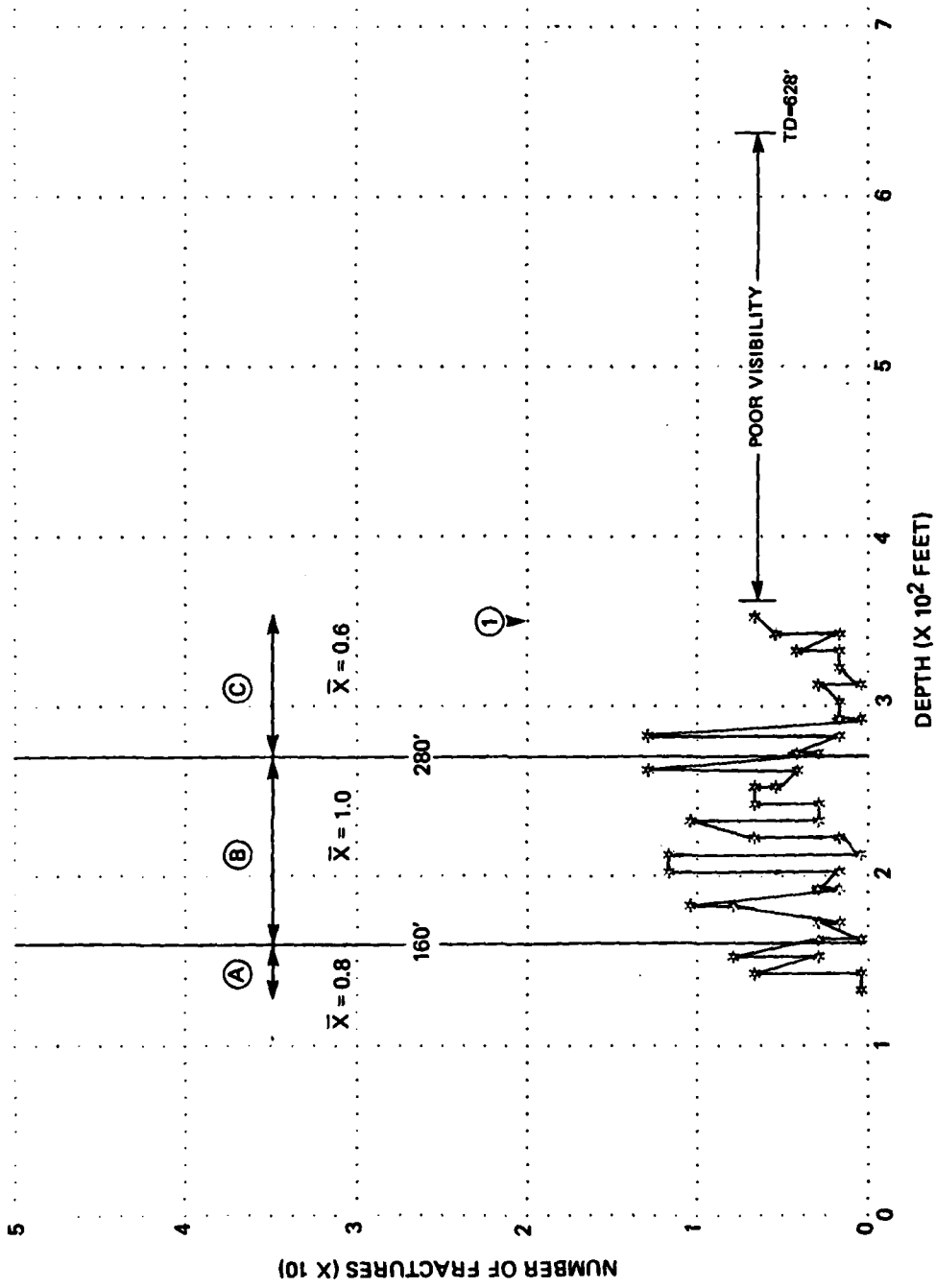
FRACTURE DENSITY FROM VIDEOLOG CE-DT-4

30 NOV 81

FIGURE 8



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FRACTURE DENSITY FROM VIDEOLOG
CE-DT-5

30 NOV 81

FIGURE 9

and 669 feet (177 and 204 m) below land surface. Although this same trend cannot be observed for CE-DT-5, the correlation between the geophysical logs and fracture density of the two wells also indicates a higher fracture density in the water producing zones in CE-DT-5.

Identification of water-bearing versus nonwater-bearing fractures within CE-DT-5 cannot be readily determined from the various logging tools. An indication of water-bearing zones can, however, be determined by observing the change in viscosity of the drilling mud during actual drilling operations. This information, in conjunction with the 3-D velocity log, indicates that water-bearing zones correlate with the major vertical fractures below the 500-foot (152-m) level. Based on the 3-D velocity log, the main water producing zones presumably occur between 571 to 580 feet (174 to 177 m) and 600 to 610 feet (183 to 186 m). This is supported by the fact that circulation of drilling fluids was lost at 571 feet (174 m) and was never regained. Based on geophysical logs, lithology, and the major zones of lost circulation, the main water-bearing zones presumably occur near the base of the Anchor Member and the top of the Dawn Member (?) of the Monte Cristo Limestone.

3.0 AQUIFER TESTING

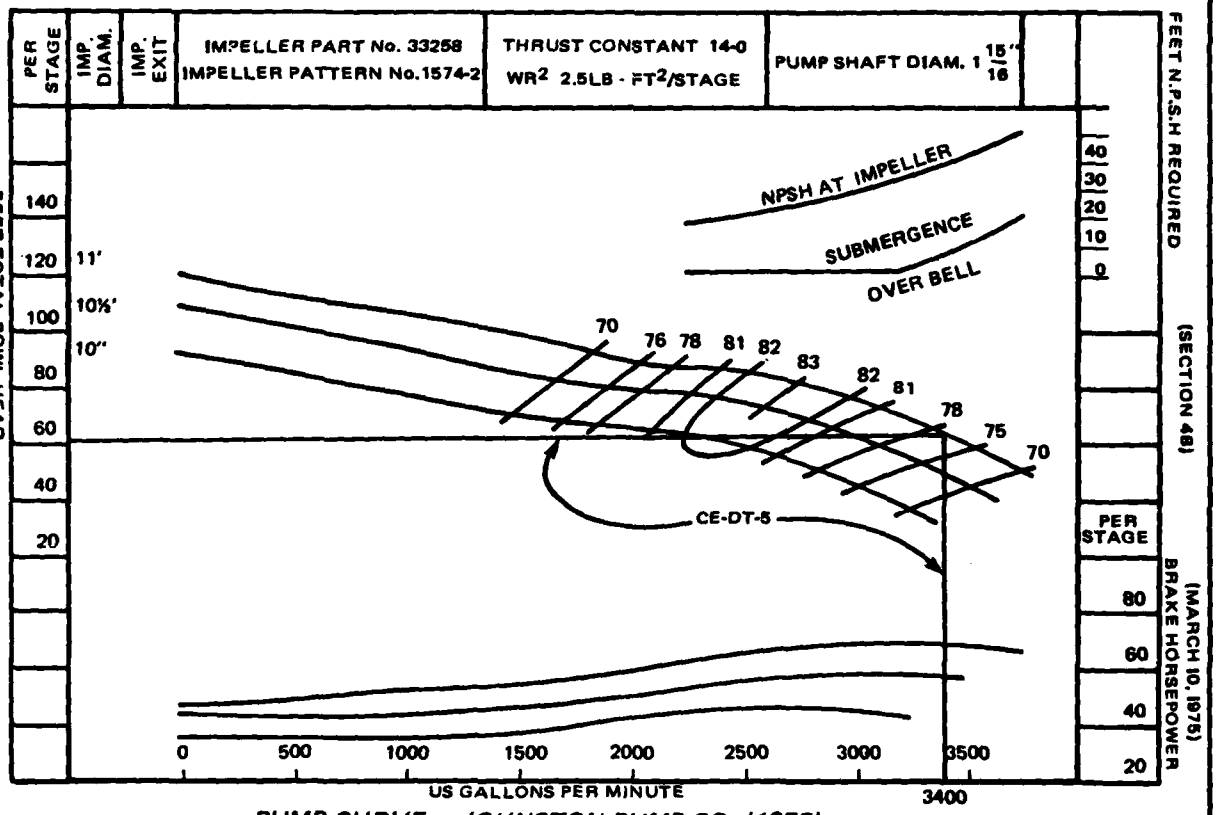
3.1 AQUIFER TESTING AND MONITORING PROGRAM

3.1.1 Well Development

Hydrologic testing activities began in mid-June with bailing of the test well and two of the observation wells for the purpose of well cleaning and development. The pump assembly in the test well was set on 29 June and development by pumping began on 3 July continuing intermittently through 9 July. During development, the pump was surged allowing the water in the pump column to backflush the formation.

The pumping equipment used for the aquifer testing at CE-DT-5 is described in Figure 10. The pump was set at a depth of 500 feet (152 m) below land surface. The discharge during pumping was diverted in an easterly direction away from the well through 200 feet (61 m) of 10-inch (25-cm) ID pipe where the water discharged onto a metal spreader box to retard the velocity and then into a modified alluvial channel. The discharge was measured by means of 10 x 7-inch (25 x 18-cm) and 12 x 10-inch (30 x 25-cm) orifice plates and a piezometer tube installed on the discharge pipe.

During initial development on 3 July, the water was gray to black with a fetid odor which began to clear after 30 minutes of pumping at a discharge rate of 600 gpm (38 l/s). The well was subsequently surged at 500 gpm (31 l/s) intervals up to 2700 gpm (170 l/s) in order to clear the water. Development began again on 4 July; the water became murky gray at 2500 gpm



PUMP CURVE – JOHNSTON PUMP CO. (1975)

PUMPING UNIT DATA

PUMP

TYPE: VERTICAL TURBINE
BRAND: JOHNSTON
MODEL/STAGES: 14EC/8 STAGE
RPM: 1770
IMPELLER: FULL (11")
COLUMN PIPE: 10" X 20'
LENGTH: 500'
OIL TUBE: 3"
LINE SHAFT: 1 15/16"
BEARING CENTERS: 5'

GEAR HEAD

BRAND: RANDOLPH F500
RATIO: 1:1
THRUST CAPACITY: 20,000#

MOTOR

BRAND: CATERPILLAR
MODEL: D-348 TURBO CHARGED
HP: 700 WTH PTO

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PUMP CURVE AND PUMPING UNIT DATA FOR CE-DT-5 AQUIFER TEST

30 NOV 81 FIGURE 10

(158 l/s) but cleared in 20 minutes. The well was further developed early on 9 July in five steps up to 3400 gpm (214 l/s) until the water was clear.

3.1.2 Aquifer Testing

Two types of aquifer tests were conducted at CE-DT-5, a step-drawdown test and a series of eight constant discharge tests. The step-drawdown test, consisting of six stages with discharge rates ranging from 600 gpm (38 l/s) to 4000 gpm (252 l/s) was conducted on 9 July. This testing verified that the well could easily sustain the long-term pump/engine capacity of 3400 gpm (214 l/s). This pumping rate was selected for the constant discharge testing.

The constant discharge test was started on 12 July. Pumping shutdowns, due to a variety of mechanical difficulties involving the diesel test engine and pump gearhead assembly, occurred intermittently throughout the first three weeks of testing. Well yield and aquifer characteristic data were obtained during this period. However, because the longest sustained pumping period was approximately four days, results were not deemed appropriate to meet one of the objectives of testing, that being assessment of impacts of long-term continuous water withdrawal. Following a series of repairs to the test engine, pumping was restarted on 31 July. Testing proceeded uninterrupted until 12 August when the Air Force ordered a shutdown at the request of local citizenry who believed the well discharge was contributing to severe flooding which occurred in the Moapa

Valley area on 11 and 12 August. Since this shutdown occurred near the 300-hour mark, scheduled engine maintenance was performed. The test was restarted approximately 24 hours later on 13 August. Test pumping continued uninterrupted until 25 August (294 hours continuous pumping) when a clutch bearing on the test engine failed. A replacement engine was delivered to the site on 26 August and the test restarted. Due to unknown factors, the replacement engine could not achieve design horsepower output and would only pump a maximum of 2700 gpm (170 l/s). Prior to any resolution of this problem, the engine suffered a mechanical breakdown on 27 August. At this point, it was decided to postpone restart of the test until repairs on the original engine were completed. Repairs were completed and test pumping restarted late on 28 August. The test continued without incident through 11 September when a scheduled engine maintenance was performed. After a shutdown period of approximately three hours, the test was continued. The test proceeded with no further mechanical problems or scheduled shutdowns for the duration of the 30-day period. The aquifer test was terminated on 27 September. Total duration of the test period was 30 days and three hours. A detailed chronological history of aquifer testing is provided in Appendix B1.1. A list of tests and test durations is given in Table 2.

3.1.3 Monitoring

An extensive monitoring program was conducted concurrently with aquifer testing at CE-DT-5. The program consisted of monitoring the discharge and water chemistry of six selected

TEST ACTIVITY	PUMP ON date	PUMP ON time	PUMP OFF date	PUMP OFF time	DURATION
Development	7/3/81	1430	7/4/81	0010	9 hrs. 40 min.
Development	7/4/81	1522	7/5/81	0344	12 hrs. 22 min.
Development	7/9/81	0415	7/9/81	0923	5 hrs. 8 min.
Step-Drawdown	7/9/81	2115	7/10/81	0604	8 hrs. 49 min.
Constant Discharge #1	7/12/81	1042	7/13/81	1700	1 day 6 hrs. 18 min.
Constant Discharge #1b	7/13/81	1757	7/14/81	1300	19 hrs. 3 min.
Constant Discharge #2	7/17/81	1312	7/18/81	0526	16 hrs. 13 min.
Constant Discharge #3	7/18/81	2052	7/22/81	1100	3 days 14 hrs. 52 min.
Constant Discharge #4	7/24/81	1925	7/28/81	0717	3 days 11 hrs. 52 min.
Constant Discharge #5	7/29/81	1934	7/30/81	1714	21 hrs. 40 min.
Constant Discharge #6a	7/30/81	2221	8/12/81	1538	12 days 17 hrs. 17 min.
Constant Discharge #6b	8/13/81	1247	8/25/81	1057	11 days 22 hrs. 10 min.
Constant Discharge #7a	8/26/81	1029	8/27/81	1420	1 day 3 hrs. 51 min.
Constant Discharge #7b	8/27/81	1434	8/27/81	1500	26 min.
Constant Discharge #8	8/28/81	1839	9/27/81	2139	30 days 3 hrs.

* pump off three hours for scheduled engine maintenance.

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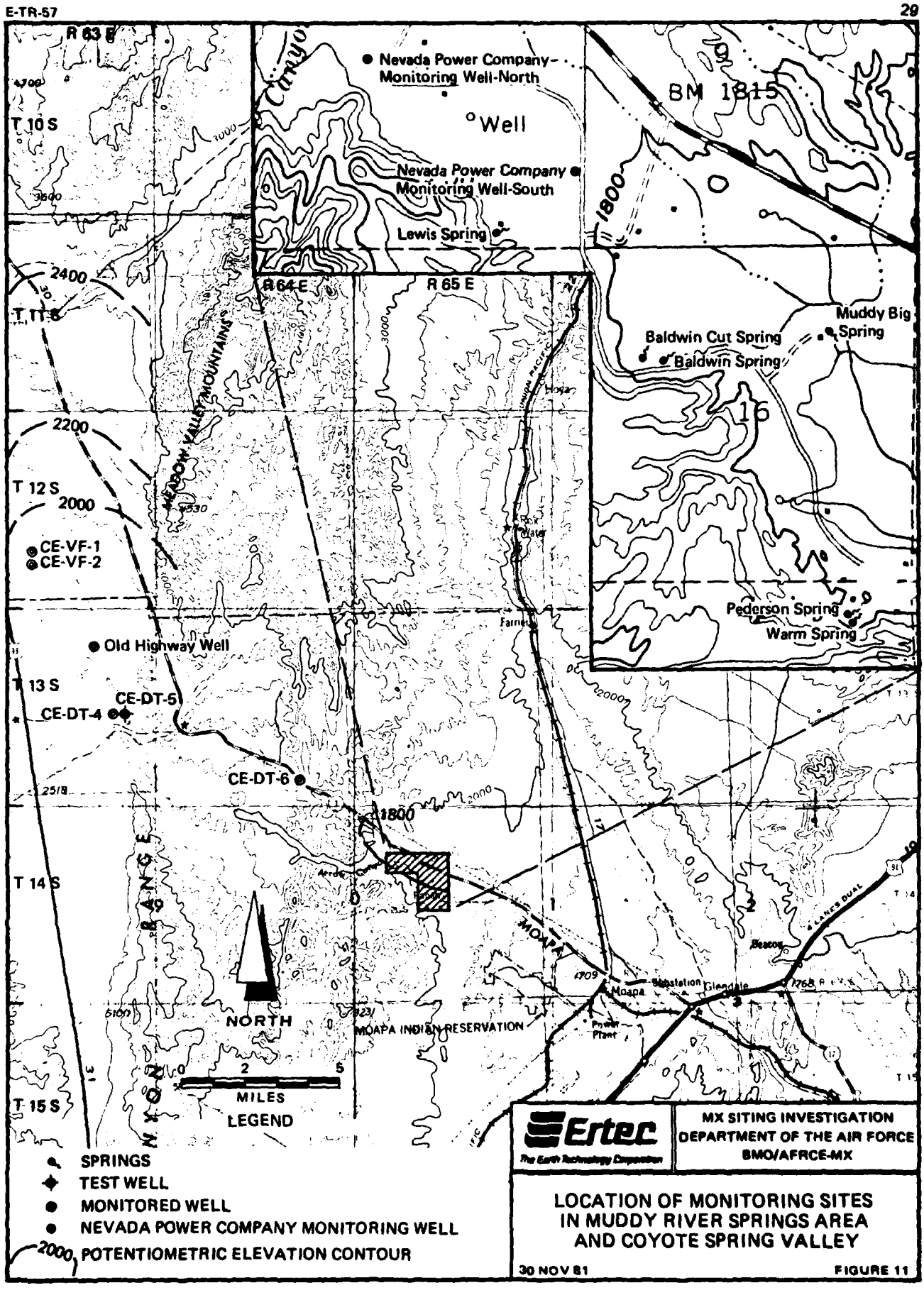
SCHEDULE OF AQUIFER TESTING AT CE-DT-5

30 NOV 81 TABLE 2

springs and the measurement of water levels in seven observation wells and the test well. All springs and two of the observation wells were in the Muddy River Springs area. Five observation wells were monitored in Coyote Spring Valley. The locations of these monitoring sites are shown in Figure 11. Well and spring descriptions, equipment used for monitoring, frequency of data collection, and tests performed at the monitoring sites are summarized in Table 3.

Four of the observation wells monitored in Coyote Spring Valley were drilled by Ertec Western as part of the MX water resource investigation. The fifth well, the "Old Highway Well", is an abandoned stock well. Water-level data for the pumping well and CE-DT-4 were collected using an electropiezo recorder and pressure transducers with periodic checks made with an electric sounder. One hundred PSI transducers were used in both wells. The barometric pressure was monitored using a 50 psi transducer. All other monitoring wells in Coyote Spring Valley were monitored by electric sounder. Water level measurements for the two wells in the Muddy River Springs area were made available by Nevada Power Company through the Desert Research Institute, University of Nevada System. Water-level data for the pumping well are listed in Appendix B1.2. Water-level data for all observation wells are listed in Appendix B1.3.

Water samples for laboratory analyses were collected from all spring monitoring sites prior to beginning of testing and at


R 63 E
R 64 E
R 65 E
T 10 S
T 11 S
T 12 S
T 13 S
T 14 S
T 15 S
Nevada Power Company-Monitoring Well-North
Well
Nevada Power Company Monitoring Well-South
Lewis Spring
BM 1815
Baldwin Cut Spring
Baldwin Spring
Muddy Big Spring
Pederson Spring
Warm Spring
CE-VF-1
CE-VF-2
Old Highway Well
CE-DT-5
CE-DT-4
CE-DT-6
MEADOW VALLEY MOUNTAINS
NORTH
MOAPA INDIAN RESERVATION
MILES
LEGEND
SPRINGS
TEST WELL
MONITORED WELL
NEVADA POWER COMPANY MONITORING WELL
POTENTIOMETRIC ELEVATION CONTOUR
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LOCATION OF MONITORING SITES IN MUDDY RIVER SPRINGS AREA AND COYOTE SPRING VALLEY
30 NOV 81
FIGURE 11

Coyote Spring Valley

o CE-DT-5 - pumping well
  - 13S/63E-23dd2
  - land surface elevation is 2169.03 feet
  - well depth is 628 feet
  - well has a conductor casing set from 0 to 126 feet and is an open borehole from 126 feet to 628 feet
  - static water level is 349.7 feet below land surface
  - monitored by electropiezo recorder and 100 psi pressure transducer with periodic checks made with an electric sounder
  - water level during pumping and recovery was measured on the schedule defined as follows:

Length of Time from Start of Pumping	Monitoring Interval
0 to 30 minutes	one minute
30 to 60 minutes	five minutes
60 to 240 minutes	30 minutes
240 minutes to end of test	one hour

o CE-DT-4 - observation well (carbonate)

  - 13S/63E-23dd1 (330 feet west of CE-DT-5)
  - land surface elevation is 2172.58 feet
  - well depth is 669 feet
  - well has a conductor casing set from 0 to 50 feet and is an open borehole completion from 50 feet to 669 feet
  - static water level is 352.3 feet below land surface
  - monitored by electropiezo recorder and pressure transducer (same unit as in pumping well)
  - water level during pumping and recovery measured on the schedule defined as referenced for CE-DT-5

o CE-DT-6 - observation well (carbonate)

  - 13S/64E-35aa (6.7 miles east of CE-DT-5)
  - land surface elevation is 2274.57 feet
  - well depth is 937 feet
  - well has a conductor casing set from 0 to 87 feet, blank casing from 0 to 325 feet, and is an open borehole from 325 feet to 937 feet
  - static water level is 457.4 feet below land surface
  - monitored by electric sounder
  - water level measured every 12 hours 7/11/81 through 7/30/81 then every 24 hours for the remainder of the test

o CE-VF-1 - observation well (valley fill)

- 12S/63E-29db1 (6.3 miles northwest of CE-DT-5)
- land surface elevation is 2464.18 feet
- piezometer depth 714 feet
- piezometer is slotted from 620 feet to 714 feet below land surface
- static water level is 548.1 feet below land surface
- monitored by electric sounder
- water level measured every 24 hours except the period from 8/1/81 through 8/7/81 in which measurements were taken every 12 hours

o CE-VF-2 - observation well (carbonate)

- 12S/63E-29db2 (6.3 miles northwest of CE-DT-5)
- land surface elevation is 2466.86 feet
- well depth is 1221 feet
- well is cased with blank casing from 0 to 860 feet and is an open borehole from 860 to 1221 feet
- static water level is 611 feet below land surface
- monitored by electric sounder
- water level measured every 24 hours except during the period of 8/1/81 through 8/7/81 in which measurements were taken every 12 hours

o Old Highway Well - observation well (valley fill)

- 13S/63E-11ba (2.9 miles north of CE-DT-5)
- land surface elevation is 2223.63 feet
- well depth is unknown
- static water level is 164 feet below land surface
- monitored by electric sounder
- water level measured every 24 hours for the duration of testing

Muddy River Springs Area

o Warm Spring - natural spring

- 14S/65E-21aa1
- land surface elevation is 1809.04 feet
- monitored by 3-inch parshall flume with type F recorder
- continuous discharge measurement during and for one month after completion of test
- field measurements of pH, alkalinity, temperature and specific electrical conductance of spring discharge were taken every 12 hours up to 7/27/81 and once every 24 hours for the remainder of the test

- Pederson Spring - natural spring
  - 14S/65E-21aa2
  - land surface elevation is approximately 1800 feet
  - monitored by 3-inch parshall flume with type F recorder
  - continuous discharge measurement during and for one month after completion of test
  - field water chemistry and spring discharge measured on same schedule as Warm Spring
- Baldwin Spring - natural spring
  - 14S/65E-16bc1
  - land surface elevation is approximately 1800 feet
  - monitored by 8-inch cut-throat flume
  - discharge and field chemistry measured on same schedule as Warm Spring
- Baldwin Cut Spring - natural spring
  - 14S/65E-16bc2
  - land surface elevation is 1799.66 feet
  - monitored by 3-inch parshall flume
  - discharge and field chemistry measured on same schedule as Warm Spring
- Lewis Spring - developed spring
  - 14S/65E-8dd
  - land surface elevation is approximately 1812 feet
  - monitored by bucket and stop watch method
  - discharge and field chemistry measured on same schedule as Warm Spring
- Muddy (Big) Spring - natural spring
  - 14S/65E-16ad
  - land surface elevation is 1760.14 feet
  - monitored by 3-foot parshall flume
  - discharge and field chemistry measured on same schedule as Warm Spring
- Nevada Power Company Observation Well-North
  - 14S/65E-8b
  - monitored by the Desert Research Institute*
  - continuous water level measurements prior to, during and subsequent to testing

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DESCRIPTION OF MONITORING STATIONS, MEASUREMENT TECHNIQUES, AND MONITORING SCHEDULE DURING TESTING OF CE-DT-5

30 NOV 81 PAGE 3 OF 4 TABLE 3

- Nevada Power Company Observation Well-South
  - 14S/65E8d
  - monitored by the Desert Research Institute*
  - continuous water level measurements prior to, during and subsequent to testing

* Water level data for these wells were provided by the Desert Research Institute at the direction of Nevada Power Company.

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DESCRIPTION OF MONITORING STATIONS, MEASUREMENT TECHNIQUES, AND MONITORING SCHEDULE DURING TESTING OF CE-DT-5	
30 NOV 81 PAGE 4 OF 4 TABLE 3	

the completion of the test period. Field measurements of spring discharges and selected chemical parameters were made as summarized in Table 3. Field data collected at the springs are listed in Appendix B1.4. Laboratory analyses results are presented in Appendix B1.5.

During the step-drawdown test, field measurements of pH, temperature, specific electrical conductance, and bicarbonate were made of water from the test well prior to the completion of each step. During constant discharge tests #1 and #2, field measurements were made once every five minutes for the first hour of the test, once every 30 minutes for the next three hours, once every hour for the next eight hours, and once every 12 hours for the remainder of the test. Field measurements were made once every 12 hours during tests #3 through #8. Water samples for laboratory analyses were taken five times during the test period. Laboratory analyses results and field chemistry data for well CE-DT-5 are listed in Appendix B1.5.

3.2 ANALYSIS AND INTERPRETATION

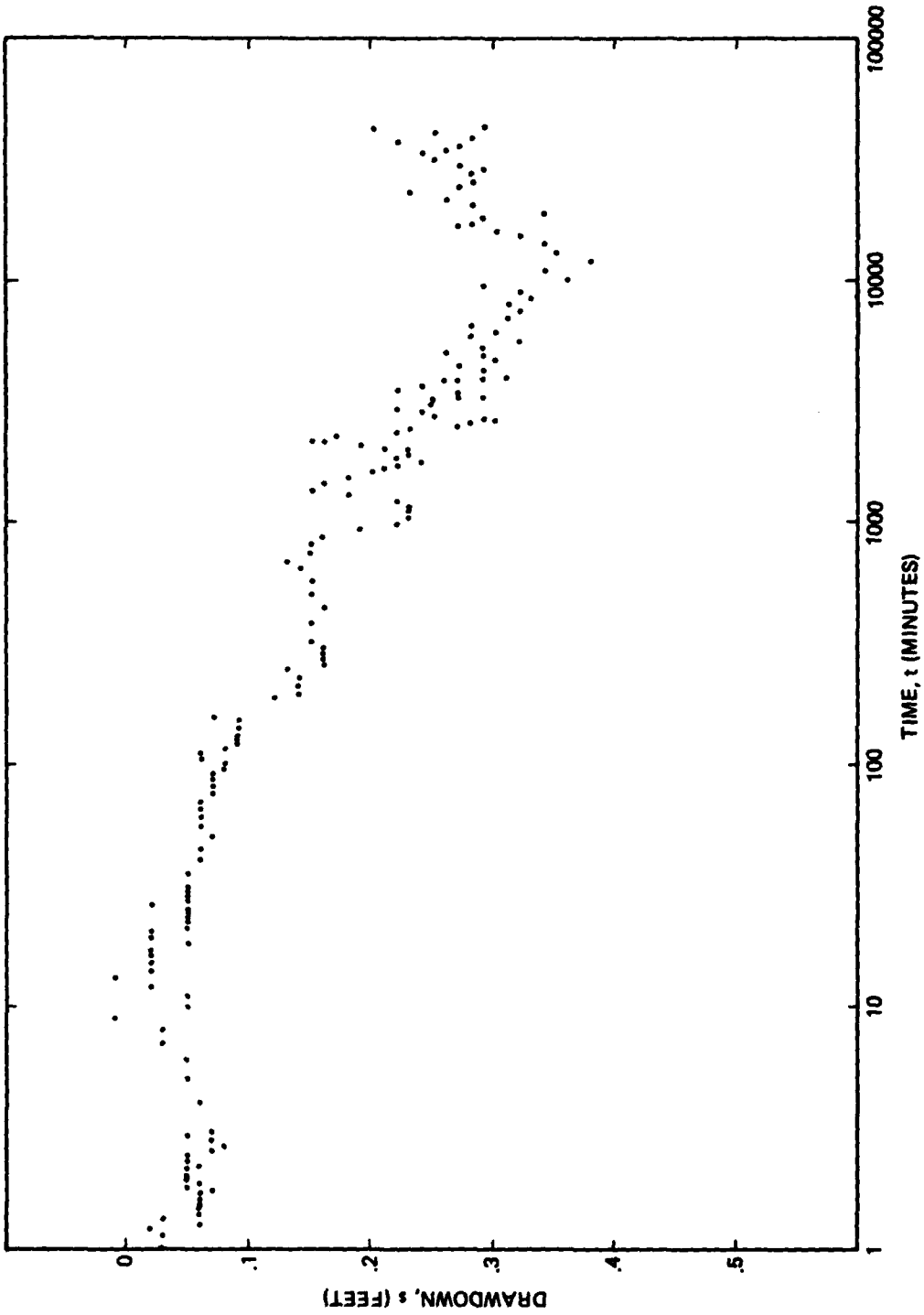
3.2.1 Ground-Water Levels and Spring Discharge Rates

During aquifer testing of CE-DT-5, hydraulic response was observed only at observation well CE-DT-4. No response was observed in other observation wells or at the springs which could be attributed to the pumpage. Diurnal microvariations, which appear as fluctuations in ground-water levels and spring discharge rates, result from cyclic variations in barometric pressure and/or earth tide effects.

Ground-Water Levels

At observation well CE-DT-4, minor water-level declines occurred during the testing of CE-DT-5. The maximum observed drawdown was 0.38 feet (0.12 m) that occurred after 12,000 minutes (8.3 days) of pumping at a constant discharge rate of 3400 gpm (215 l/s) during test #8. The water level drawdown data for CE-DT-4 are shown graphically in Figure 12. No response is readily apparent for the first 500 minutes of testing. Following this, water levels began to exhibit cyclic fluctuations with an overall declining trend for the duration of pumpage. During maintenance shutdowns or pump failures, the water level recovered fully to prepumping levels within three minutes.

The cyclic variations in the water levels at CE-DT-4 correspond in period with variations in barometric pressure. The relationships are inverse, i.e., water-level declines correspond with increases in barometric pressure. As noted by Ferris and others (1962, p. 132), such variations in water levels are indicative of confined aquifer conditions. Shown in Figure 13 are barometric pressure data during a portion of test #6a and #6b. The cyclic pattern is seen to be similar to the fluctuations observed in the drawdown record at CE-DT-4 (Figure 12). Earth-tide effects are also a potential cause of the water-level fluctuations.



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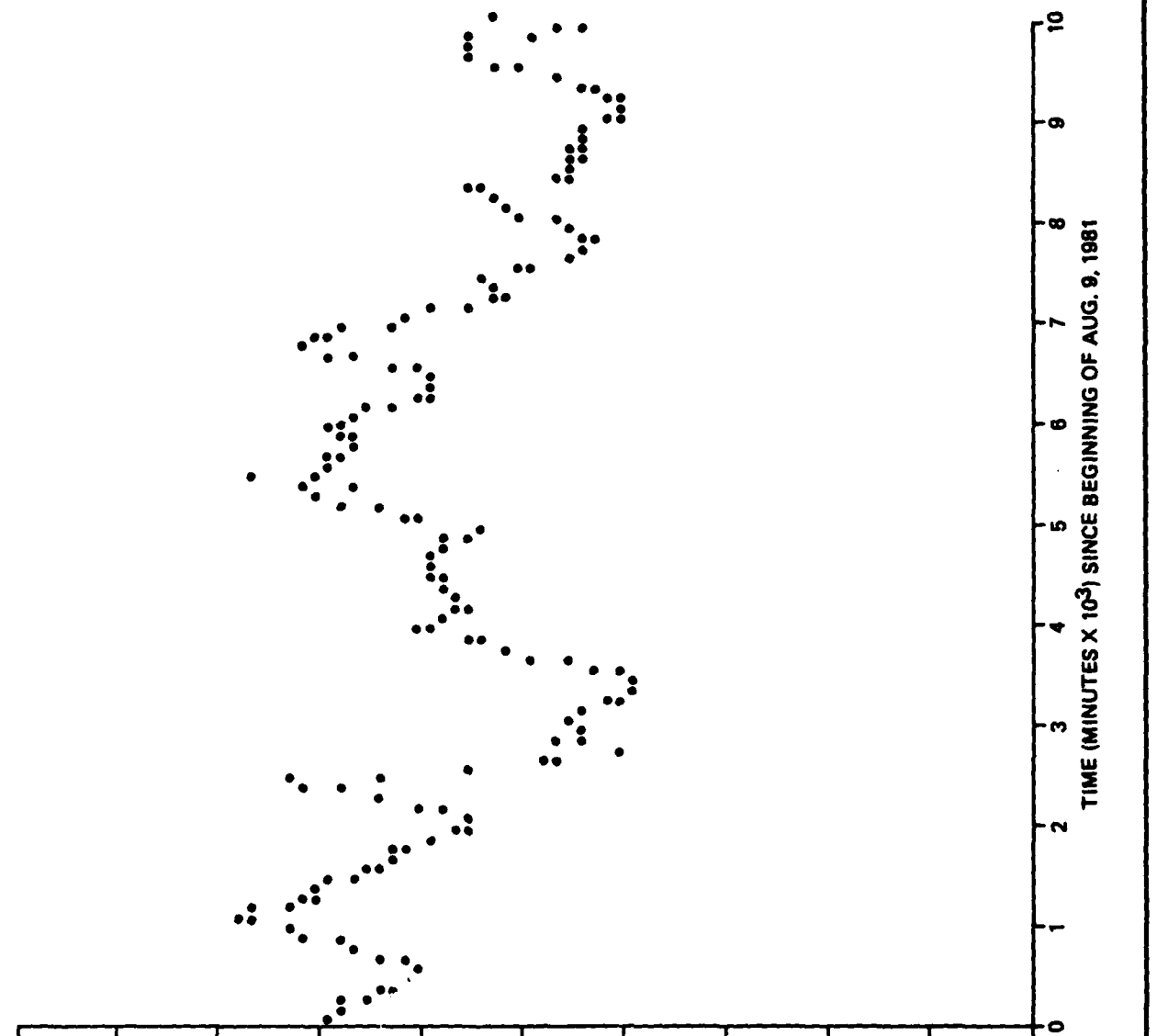
SEMILOG PLOT
DRAWDOWN VS. TIME
OBSERVATION WELL CE-DT-4
TEST NO. 8

30 NOV 81

FIGURE 12



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BAROMETRIC DATA FROM LAS VEGAS, NV.
McCARRAN AIRPORT STARTING
9 AUGUST 1981

30 NOV 81

FIGURE 13

Spring Discharge Rates

During monitoring of the six springs in the Muddy River Springs area, no changes in discharge rates were observed which could be attributed to the pumpage of CE-DT-5. Shown in Figure 14 is the discharge record for Pederson Spring from 9 August 1981 through 16 August 1980. Fluctuation in spring discharge appears to vary with atmospheric pressure and/or earth tides. Insufficient data are available to define the precise cause of discharge variation.

3.2.2 Well Hydraulics

Well Efficiency

The efficiency of a well is the ratio of theoretical drawdown to observed drawdown (Lennox, 1969). Bierschenk (1964) proposed a method for estimating well efficiency through the analysis of step-drawdown test data. Using this method, well efficiency is defined by the expression:

$$E = \frac{1}{1+(C/B)Q}$$

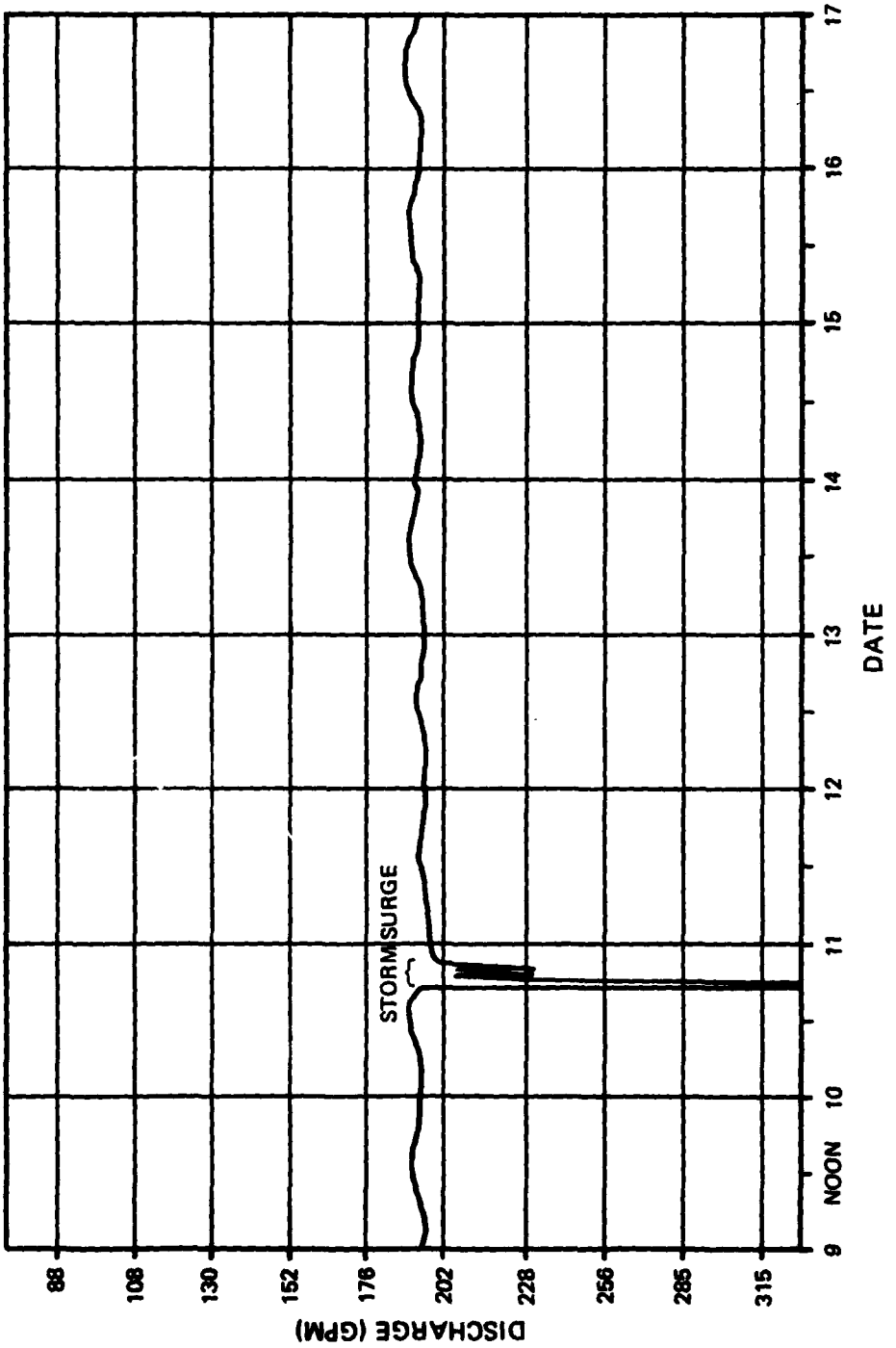
where:

E = Well efficiency,
C = Change in specific drawdown with respect to change in discharge rate, i.e.,

$$C = \frac{\frac{s_2}{Q_2} - \frac{s_1}{Q_1}}{Q_2 - Q_1},$$

B = Specific drawdown at a discharge rate of zero, i.e.,

$$B = \frac{s_2 - s_1}{Q_1 s_2 - Q_2 s_1},$$



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TIME VS. DISCHARGE RECORD
OF PEDERSON SPRING
9 AUGUST–16 AUGUST 1981

30 NOV 81

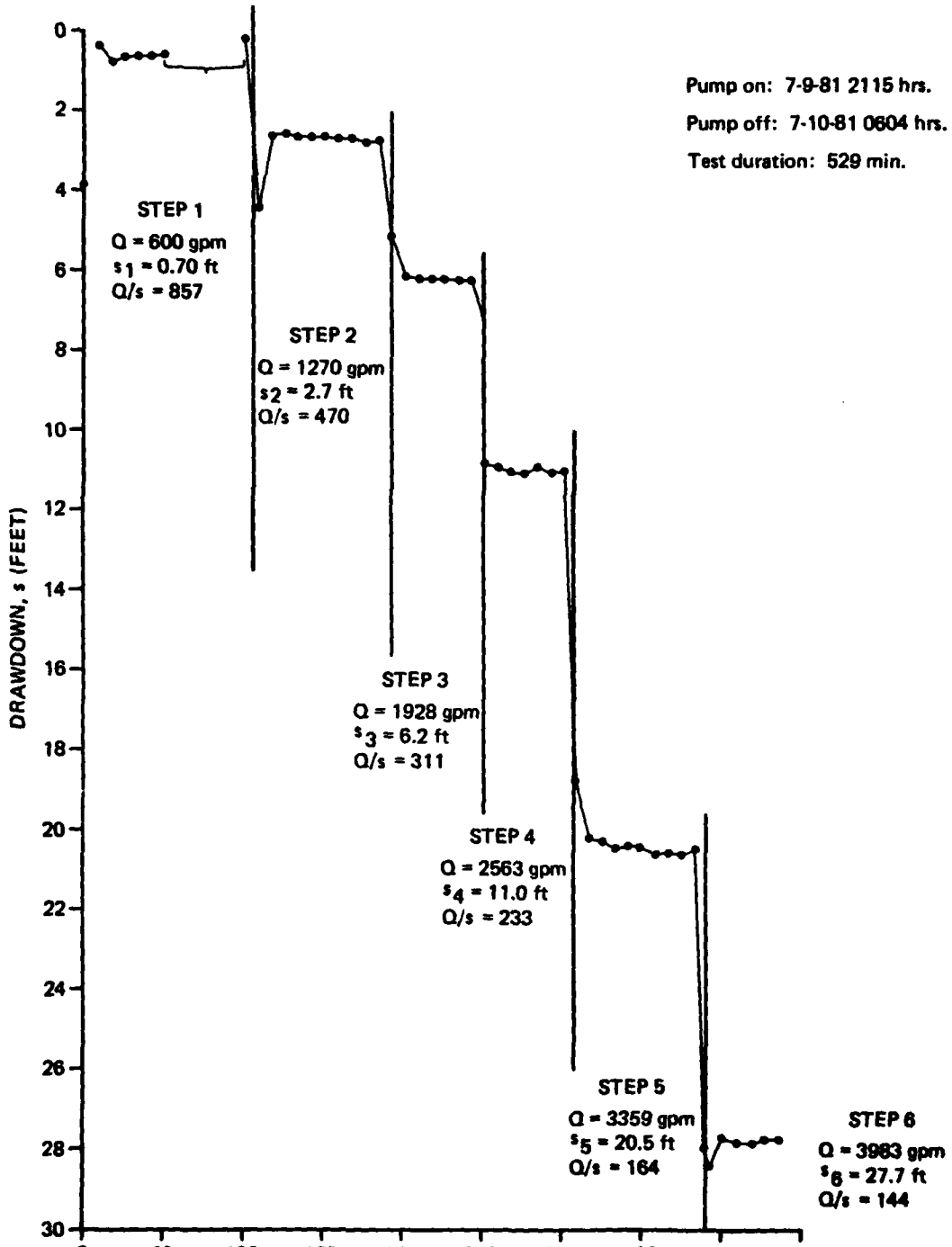
FIGURE 14

Q = Discharge in cubic feet per second (cfs),
Q_1 = Discharge at time = t_1,
Q_2 = Discharge at time = $t_1 + t$,
s_1 = Drawdown at time = t_1, and
s_2 = Drawdown at time = $t_1 + t$.

C and B may be derived either mathematically or graphically from measured values of Q and s during step-drawdown testing.

As discussed by Bierschenk (1964) and Mogg (1968), a number of factors affect the efficiency of a well. These factors include the transmissivity and storativity of the aquifer, boundary conditions, the degree of penetration and development, the discharge rate and length of pumping, aquifer compaction, the occurrance of turbulent flow and friction loss between the formation and the pumping unit, and well construction parameters including the effective open area of the screen or casing at the producing zone and the size and sorting of the gravel pack. For open borehole wells such as CE-DT-5, most of the construction effects do not occur, but the hydrologic effects can be significant.

Shown in Figure 15 is a plot of observed drawdown versus time for the initial step-drawdown test conducted at CE-DT-5. These data include the expected trend of decreasing specific capacity with increasing discharge and time. Results of further pumping, however, indicate that continued development of the well was occurring after the step-drawdown test and, therefore, an accurate determination of well efficiency could not be calculated from these data. Drawdown and discharge data from



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INITIAL STEP-DRAWDOWN TEST
CE-DT-5

30 NOV 81

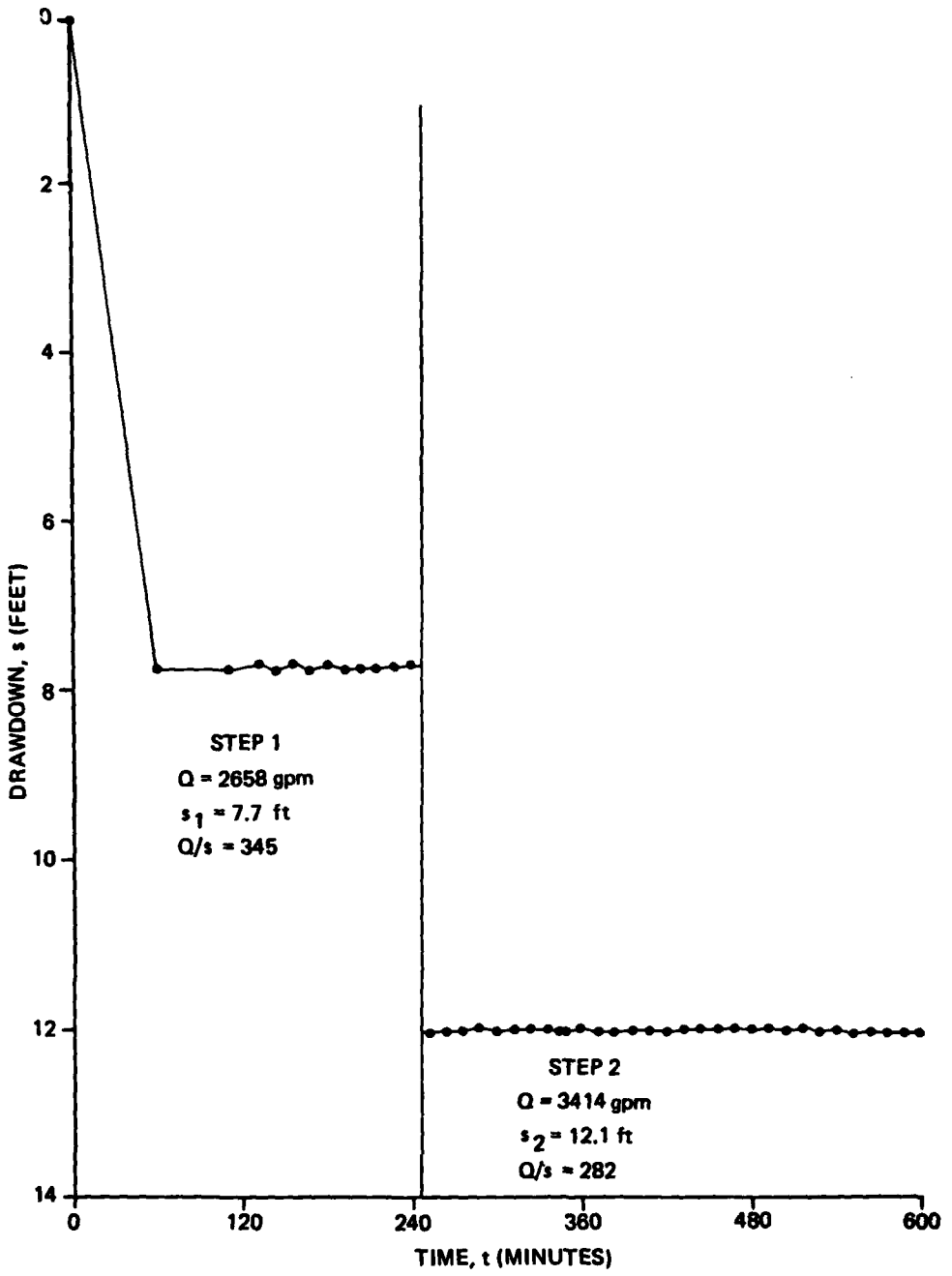
FIGURE 15

constant discharge tests #7a and #6 were used for analysis since these tests are, in essence, a long-term, step-drawdown test. These data are graphically shown in Figure 16.

Figure 17 shows the relationship between specific drawdown and discharge for CE-DT-5. The value of B is the Y intercept of the line through the observed data and was calculated to be 0.73 $ft^{-2}s$. The value of C is the slope of the line, i.e., the rate of change in specific drawdown with respect to discharge, and was calculated to be 0.09. The value of C agrees well with the correlation between C and discharge observed by Mogg (1968) for 76 step-drawdown tests. This very low value of C is indicative of high discharge rates and high specific capacities.

Figure 18 is a specific capacity diagram for CE-DT-5 based upon observed drawdown and discharge rates and the calculated values for C and B. The observed drawdown at CE-DT-5 has two components, the first is referred to as formation loss and represents the amount of drawdown which would occur at CE-DT-5 if the well were 100 percent efficient, and the second component is referred to as well loss and represents the loss in head and subsequent decrease in well efficiency due to the hydrologic effects discussed previously.

The calculated well efficiency is shown in Figure 18. As expected, the well loss and well efficiency decrease with increasing discharge. The well efficiency at production rates



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COMPOSITE STEP-DRAWDOWN TEST
CE-DT-5

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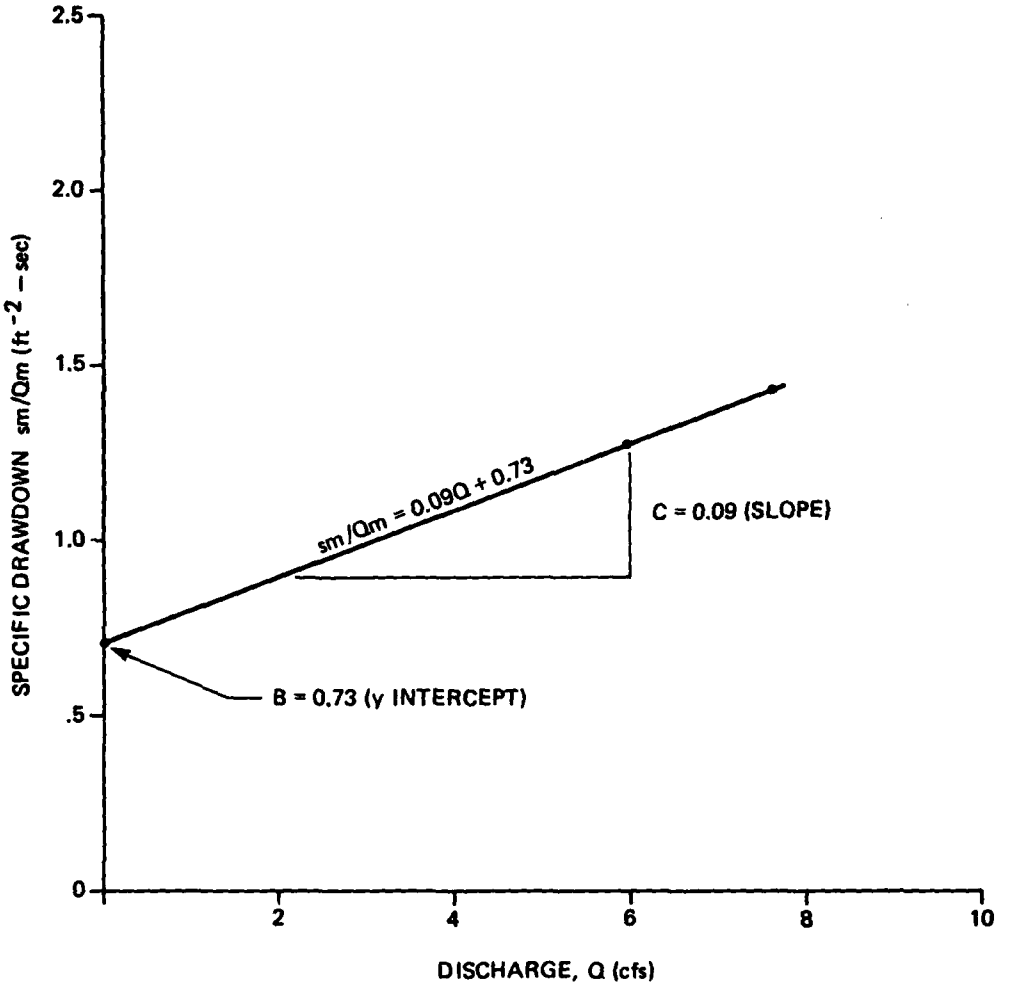
FIGURE 16



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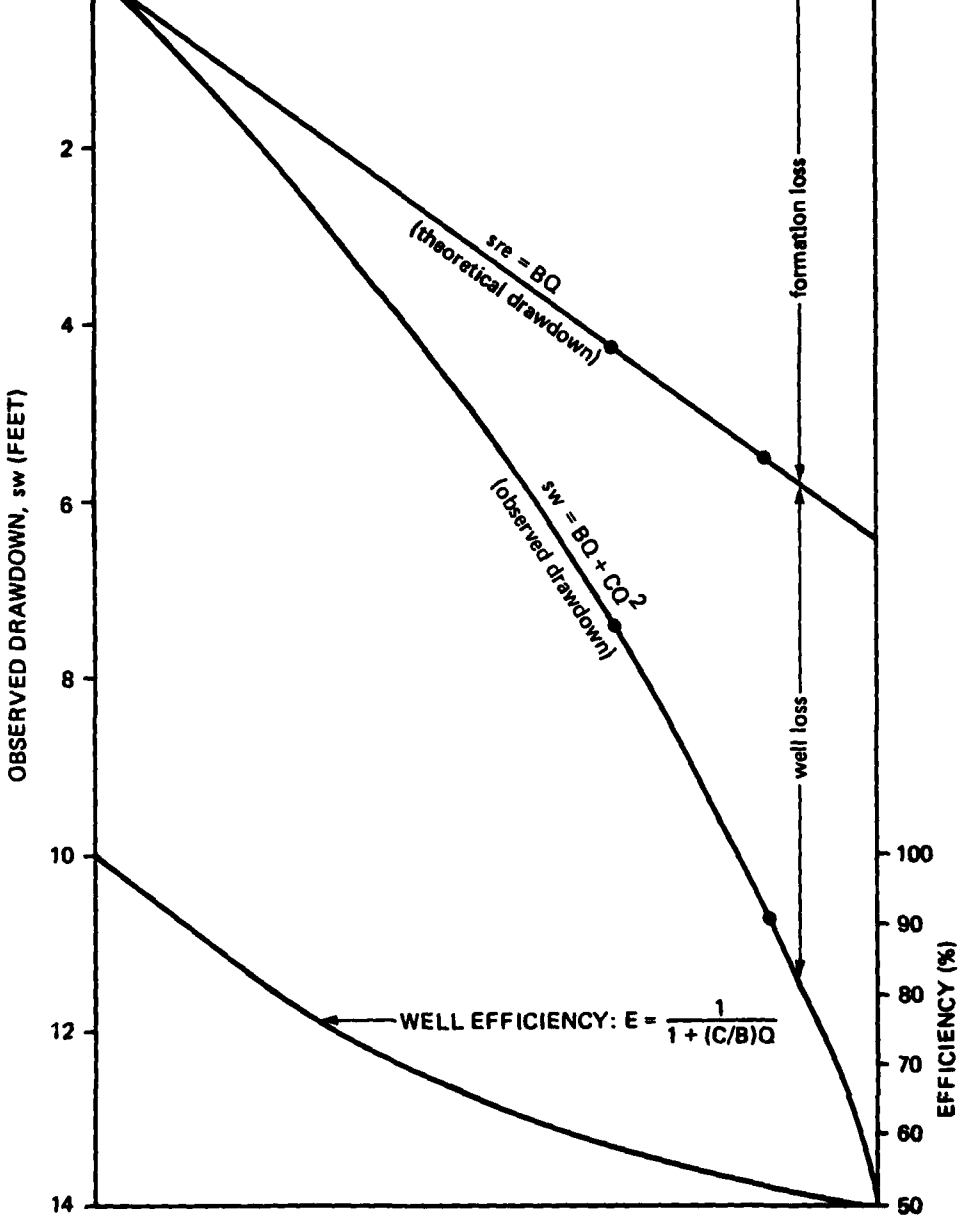
SPECIFIC DRAWDOWN VS. DISCHARGE
COMPOSITE STEP-DRAWDOWN TEST
CE-DT-5

30 NOV 81

FIGURE 17



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SPECIFIC CAPACITY DIAGRAM
CE-DT-5

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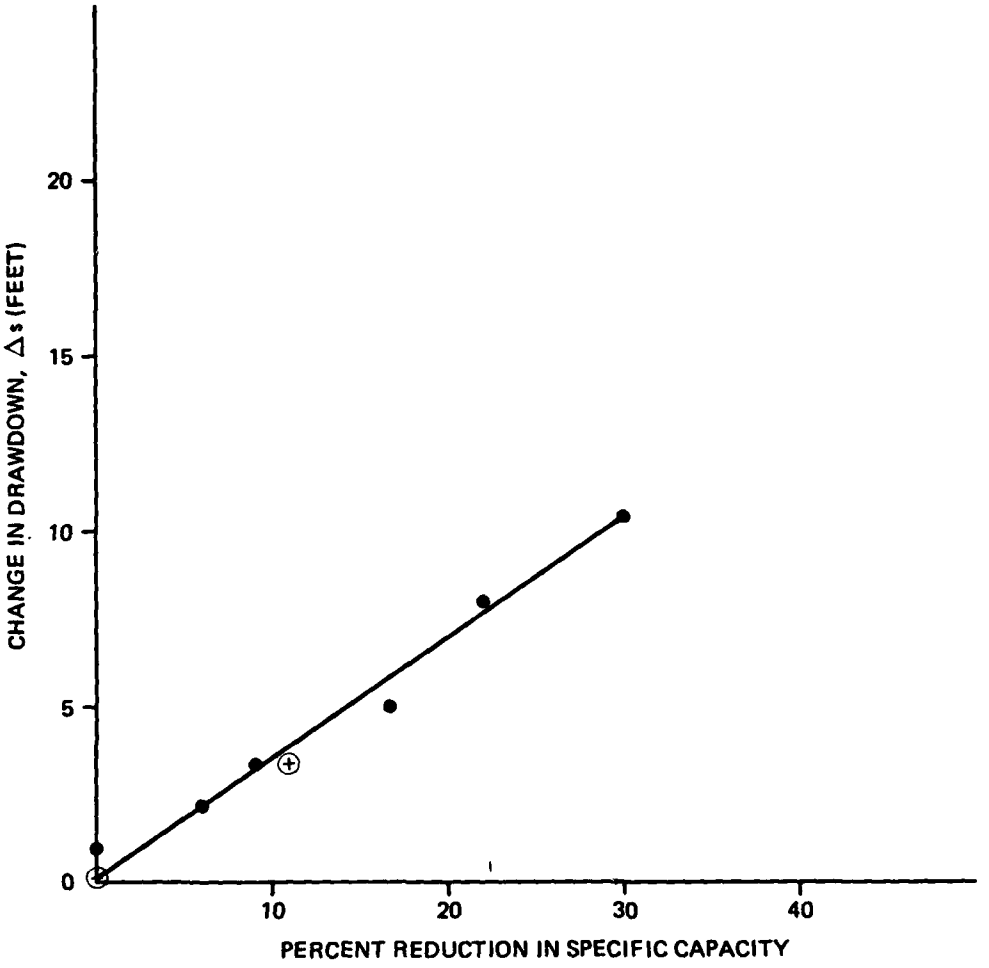
FIGURE 18

are low ranging from only 58 percent efficiency at 2658 gpm (168 l/s) to 52 percent at 3414 gpm (215 l/s). These low efficiencies indicate that significant well losses were occurring. It is inferred that most of the calculated well loss can be attributed to friction loss in the borehole between the point where ground water flows from the formation to the point where the water enters the pump intake. The videologs of CE-DT-5 indicate that the surface of the borehole is very irregular and fractured. Assuming a Hazen-Williams coefficient (Chow, 1964) of relative roughness of 50, the calculated friction loss in the 17 1/2-inch (44.4-cm) borehole over 128 feet (39 m) (the distance from the assumed producing zone to the pump intake) is 3.1 feet (0.94 m). This friction loss represents 26 percent of the total drawdown in the well and is believed to be the major source of well loss.

Another possible source of well loss in CE-DT-5 is the effect of turbulent flow in the borehole. Mogg (1968) analyzed the percent reduction in specific capacity as a function of changes in drawdown during step-drawdown tests and suggested that significant turbulent flow losses are incurred in a well if the percent reduction in specific capacity over a given discharge range exceeds 10 percent. As shown in Figure 19, an 11 percent reduction in specific capacity occurred for CE-DT-5 between 2658 and 3414 gpm (168 and 215 l/s) suggesting that turbulent flow in the borehole is also contributing to well loss.



● THEORETICAL DRAWDOWN DATA

⊕ OBSERVED DRAWDOWN DATA

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RELATION OF DRAWDOWN TO REDUCTION IN SPECIFIC CAPACITY
CE-DT-5

30 NOV 81 FIGURE 19

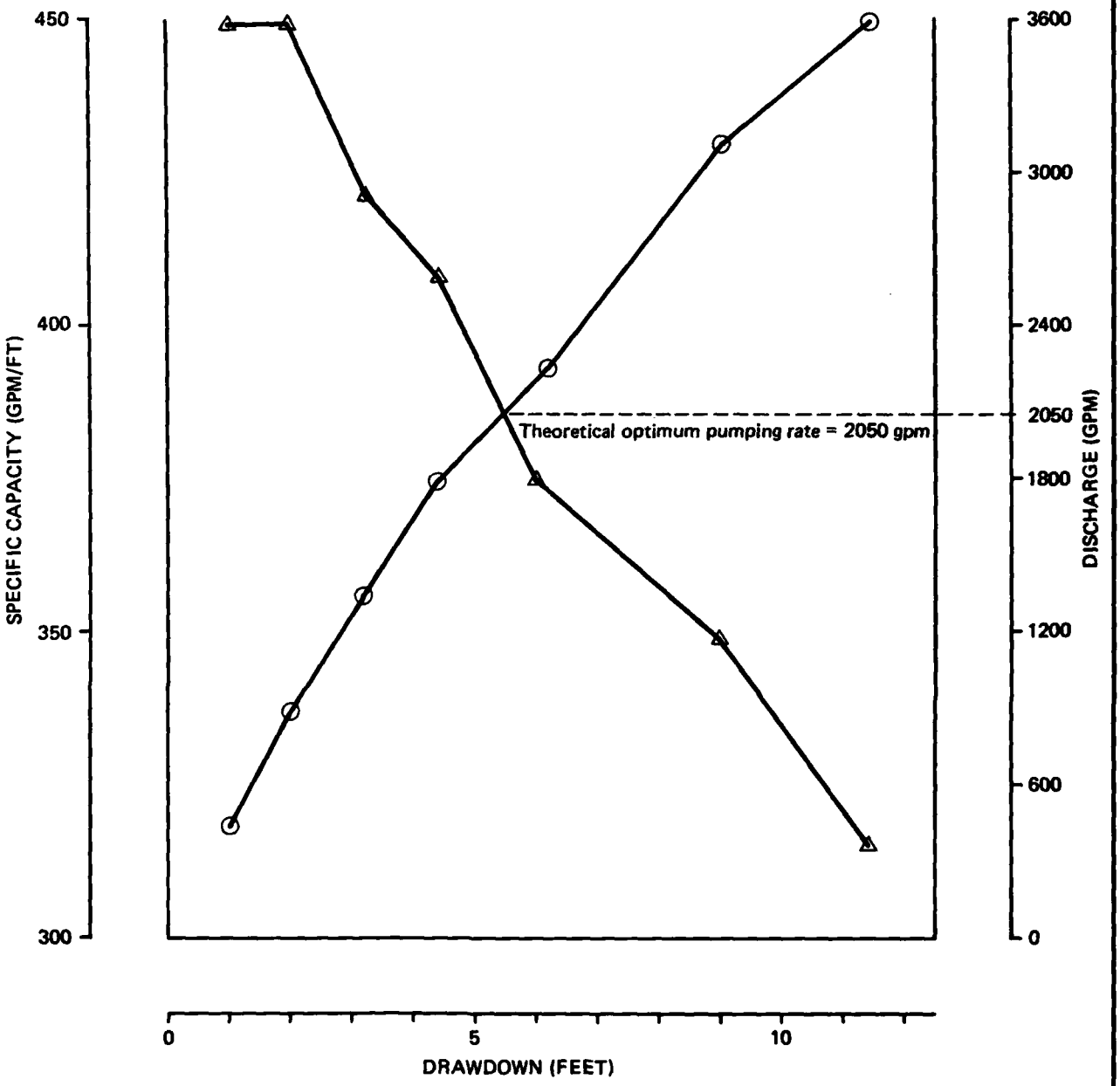
Optimum Pumping Rate

In hydrologic terms, the optimum yield of a well is defined as the pumping rate which maximizes discharge while minimizing drawdown. To determine the optimum pumping rate, the well yield (discharge versus drawdown) is plotted along with specific capacity versus drawdown as shown in Figure 20. The optimum pumping rate occurs at the point where the yield curve intersects the specific capacity curve. As shown, the theoretical optimum pumping rate for CE-DT-5 is 2050 gpm (129 l/s) at which drawdown in the well is 5.5 feet (1.6 m) and the specific capacity is 373 gpm/foot (77 l/s/m) of drawdown. The estimated well efficiency at this pumping rate is 64 percent.

The primary application of the optimum pumping rate is in the selection of the most efficient pumping unit. At CE-DT-5, the pump used during testing (a 14EC-8 stage Johnston vertical turbine pump with 11-inch [28-cm] impellers) operates at maximum efficiency at a discharge rate of 2750 gpm (176 l/s) and is too large in capacity for peak operating efficiency at the optimal pumping rate of 2050 gpm (129 l/s). The specific capacity and yield of CE-DT-5 indicate that a smaller capacity pump such as a 14DS-7 stage with 8 1/8-inch (21-cm) impellers could produce the optimum well yield at peak operating efficiency (84 percent) resulting in decreased operating costs.

3.2.3 Aquifer Mechanics

Summarized below are estimates of the regional carbonate aquifer transmissivity and storativity based upon the results



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THEORETICAL OPTIMUM PUMPING RATE, CE-DT-5

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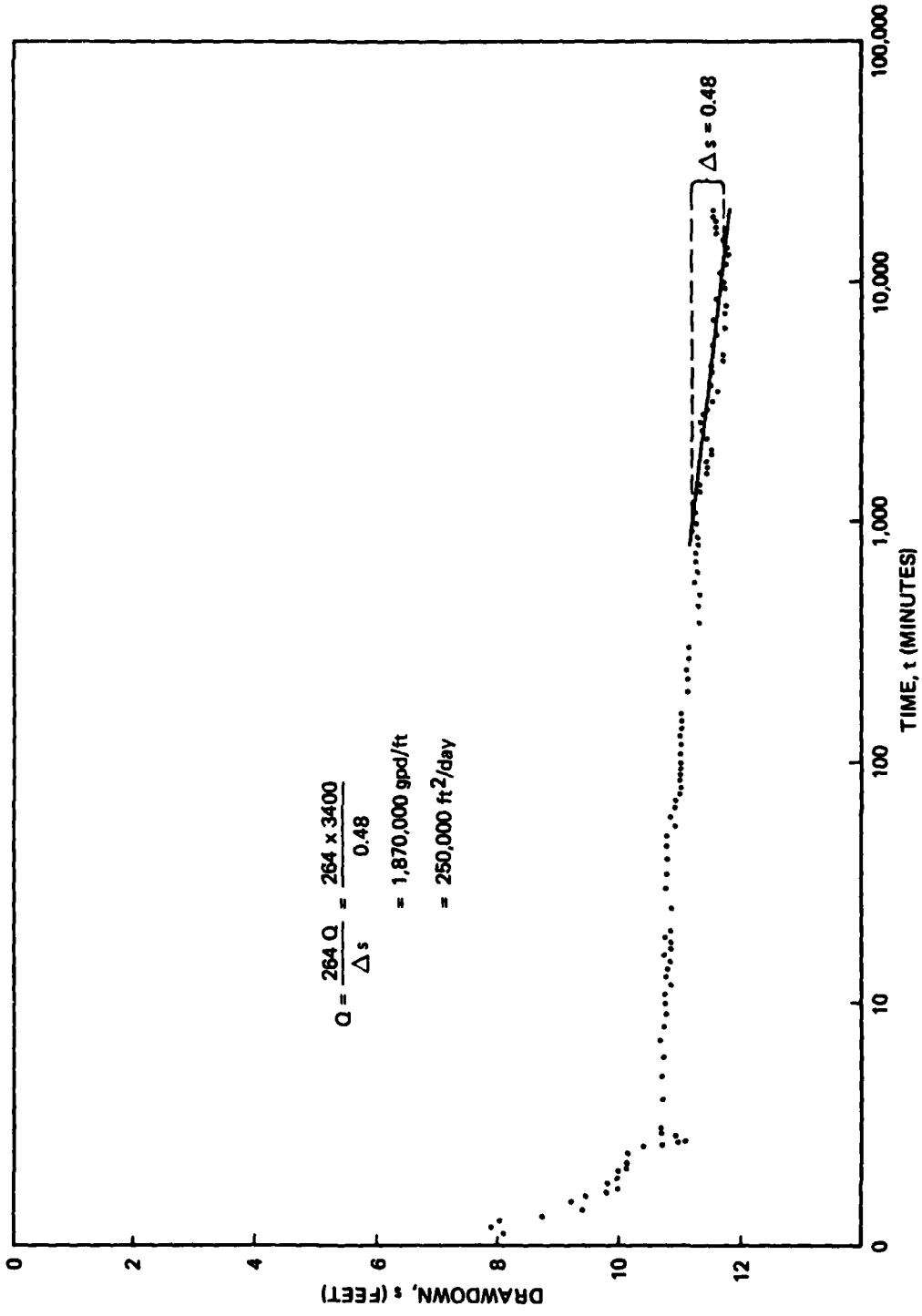
FIGURE 20

of constant discharge test #8. Drawdown data for test #8 for CE-DT-4 and 5 are listed in Appendix B1.2 and B1.3, respectively.

Transmissivity

Lohman (1972) defined transmissivity (T) as the rate at which ground water is transmitted through a unit width of an aquifer at a unit hydraulic gradient; transmissivity is equal to the product of the hydraulic conductivity (K) and the aquifer thickness (b). A number of techniques have been developed for estimating transmissivity from aquifer test data which take into account the complexity of the hydrologic system and the geometric effects of the well installation.

Shown in Figures 21 and 22 are semilog plots of drawdown versus time for the pumped well, CE-DT-5, and observation well, CE-DT-4, respectively, for test #8. As shown, 90 percent of the total drawdown (11.8 feet [3.4 m]) in CE-DT-5 occurred during the first three minutes of pumping. Analysis of this initial leg of the test will not yield a representative transmissivity for the aquifer because of well bore storage, transient start up conditions, and an initial variable pumping rate. The second leg of the test, between three and 1,000 minutes, exhibits a gentle slope (0.217 feet [0.07 m] of drawdown per log cycle) and indicates the effects of the release of water from compressible storage in the fractures and the commencement of delayed yield of water from the low permeability unfractured limestone blocks into the high permeability



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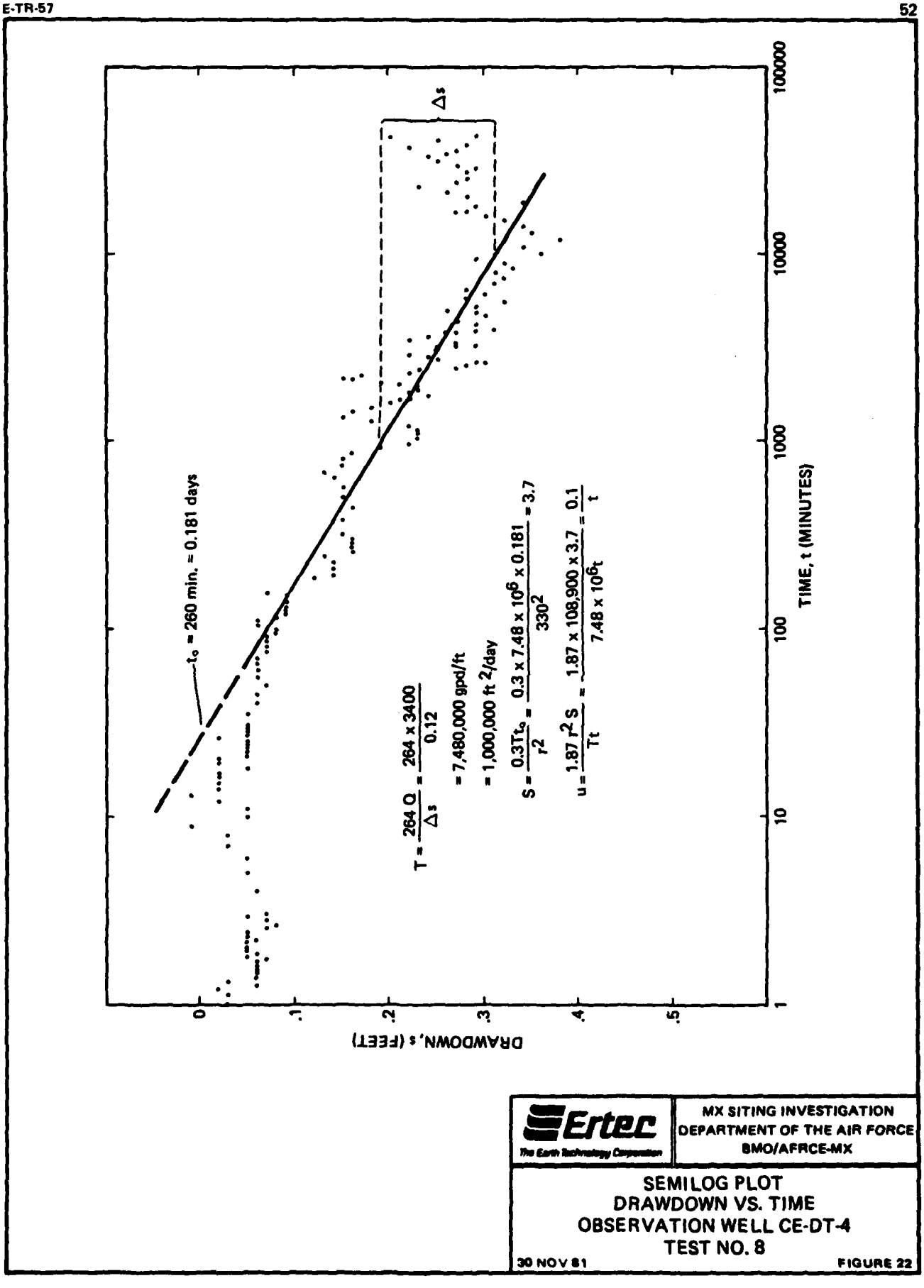
SEMILOG PLOT OF DRAWDOWN VS. TIME-PUMPING WELL CE-DT-5, TEST NO. 8

30 NOV 81

FIGURE 21



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SEMILOG PLOT
DRAWDOWN VS. TIME
OBSERVATION WELL CE-DT-4
TEST NO. 8

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FIGURE 22

fractures. The third leg of the pump test (beyond 1000 minutes) exhibits a somewhat steeper slope (0.48 feet [0.15 m] of drawdown per log cycle) which probably reflects the combined effects of release of water held in compressible storage in the fractures and in the primary limestone blocks.

The observed data for CE-DT-5 for constant discharge test #8 were analyzed using the Jacob approximation of the Theis equation:

$$T = \frac{264Q}{(s_2 - s_1)} \log \frac{t_2}{t_1}$$

where:

T = Transmissivity,
Q = Discharge rate of pumping well,
$(s_2 - s_1)$ = Change in drawdown over one log cycle, and
$\log \frac{t_2}{t_1}$ = 1 for one log cycle.

Based upon this method of analysis, the calculated transmissivity of the carbonate aquifer at CE-DT-5 is 1.87×10^6 gallons per day per foot (gpd/ft) (2.32×10^4 m^2/day).

The observed data for CE-DT-4 were analyzed using the Jacob method resulting in a calculated transmissivity of 7.48×10^6 gpd/ft (9.29×10^4 m^2/day). This estimate is for the second leg of the test curve prior to the commencement of the combined effects of compressible storage in the fractures and the primary blocks. The difference in transmissivity might also be explained by incomplete development of the observation well although it was pumped for in excess of 80 hours during previous testing.

A number of approaches have been developed for the analyses of aquifer test data for fractured flow. Gringarten and Witherspoon (1972) developed type-curve solutions for vertically fractured and horizontally fractured aquifers. These type curves were developed primarily for oil field reservoir analysis from observation well data. The data from CE-DT-4 and 5 did not closely match either the vertical- or horizontal-fracture-flow type curves. The fracture system in CE-DT-4 and 5, as indicated from videologs, includes vertical, horizontal, and inclined fractures; the system is dominated by vertical fractures.

In summary, techniques developed for fracture-flow analysis were not found to be applicable to the observed data from CE-DT-5 testing. The use of standard test analysis techniques for confined aquifers do appear to be applicable. The transmissivity of the carbonate aquifer tapped by CE-DT-4 and 5 is on the order of 1.87×10^6 to 7.8×10^6 gpd/ft (2.32×10^4 to 9.29×10^4 m^2/day). It is believed that the value calculated from the pumping well (1.87×10^6 gpd/ft [2.32×10^4 m^2/day]) is more representative of long-term aquifer transmissivity. This value is greater than the 900,000 gpd/ft (11,200 m^2/day) reported for the carbonate aquifer at the Nevada Test Site by Winograd and Thordarson (1975) and the regional transmissivity of 200,000 gpd/ft (2500 m^2/day) estimated by Eakin (1966) for the carbonate aquifers within the White River flow system.

Storativity

The storativity (S) of an aquifer is defined as the specific yield for unconfined aquifers and the storage coefficient for confined aquifers and is the quantity of water which is released from storage per unit decrease in head (Lohman, 1972). Several methods were applied to calculate storativity from drawdown data at CE-DT-4. Standard analyses resulted in indeterminate estimates (for example see Figure 21).

Jacob (in Hantush, 1956) devised a method for estimating storativity which does not require an aquifer test:

$$S = \theta\gamma b\ (\beta + \alpha/\theta).$$

where:

S = Storativity of the primary limestone block,
θ = The porosity of the aquifer (assumed to be 0.05),
γ = The unit weight of water (62 lb/ft^3),
b = The thickness of the aquifer (assumed to be 1000 feet),
β = The compressibility of water (2.29 x 10^{-8}ft^2/lb), and
α = The vertical compressibility of the aquifer (assumed to be 6.8 x 10^{-10}ft^2/lb).

Based upon this equation, the storativity of the carbonate aquifer is estimated to be on the order of 1.0 x 10^{-4}.

Distance-Drawdown Relationships

The extensive monitoring conducted during testing of CE-DT-5 did not show any significant lowering of ground-water levels nor any reduction in spring discharge rates in the Muddy River Springs area. Higher pumpage rates over a longer period of time may, however, cause some minor impacts upon the water levels in the regional aquifer. By using the Theis non-equilibrium equation, and assuming a transmissivity of 1.87 x

10^6 gpd/ft (2.32×10^4 m^2/day), a storativity of .0001 (confined conditions), a constant discharge rate of 3400 gpm (218 l/s), and a pumping period of 20 years, the drawdown at a distance of 330 feet (100 m) is calculated to be 4.1 feet (1.2 m).

3.2.4 Water Chemistry

Prior to and after completion of aquifer testing, water samples were collected for laboratory analyses from all monitored springs in upper Moapa Valley. During aquifer testing, five water samples for laboratory analyses were collected from CE-DT-5. In addition, field measurements were made of water from pumping well CE-DT-5 and at each spring for temperature, specific conductance, pH, and bicarbonate. All data are listed in Appendix B1.5. Laboratory and field water chemistry analyses showed no significant change in spring or well discharge chemistry over the period of testing.

Ground water at CE-DT-5 is of generally good quality but certain limiting conditions for direct domestic use exist. The water temperature of 95°F (35°C) indicates that cooling or mixing would be required prior to domestic consumption. Fluoride concentrations exceed the Nevada Primary Drinking Water Standard of 1.4 mg/l for areas with annual average maximum daily air temperature in excess of 79.3°F (26.3°C). Fluoride concentrations in the five samples collected from CE-DT-5 ranged from 1.7 to 1.9 mg/l.

A water sample collected on 27 September 1981 had the greatest total dissolved solids (TDS) concentration of 504 mg/l which

slightly exceeds the recommended Nevada Secondary Drinking Standard of 500 mg/l but is well below the maximum permissible level of 1000 mg/l. The range in TDS concentration is shown in Appendix B1.5. In addition, the water samples collected on 31 August and 27 September had arsenic concentrations of 0.01 mg/l which equal the maximum recommended level but are well below the maximum allowable level of 0.05 mg/l.

In cooperation with the Carson City District Office of the U.S. Geological Survey, water chemistry samples for standard and isotope analyses were collected from each of the carbonate exploration wells drilled by Ertec and from selected regional springs. Location of sites not associated with CE-DT-5 testing is shown in Figure 3. Provisional analysis results are given in Table 4. These data indicate that ground-water chemistry in the regional carbonate aquifer at CE-DT-5 is very similar to that of the Muddy River Springs but is dissimilar to regional carbonate water upgradient in the White River flow system.

Previous studies have identified a number of water chemistry trends within the White River flow system (Eakin, 1966). The analysis of the chemical composition of ground water from Ertec carbonate exploration wells and regional springs show a similar trend. As shown in Figure 23, sulfate, potassium, sodium, chloride, and magnesium increase southward through the flow system. Boron, lithium, and strontium also show increasing concentrations. Barium values, however, decrease southward through the flow system.

(SAMPLE DATE)	MORMAN SPR. 7/18/81	CRYSTAL SPR. 7/20/81	ASH SPR. 7/20/81	CV-DT-1 1/15/81	DL-DT-3 12/10/80	CE-DT-4 12/23/80	CE-DT-5 7/22/81	MUDDY BIG SPR.
ISOTOPES								
C^{13}/C^{12}	-10.6		-13.6	-8.9	-6.5	-10.6	-14.4	
H^2/H^1				-110	-108	-139		
H^3	<1.0	2.0	3.0	5.0	1.0		2.0	1.0
O^{18}/O^{16}				-14.6	-14.2	-13.0		
C^{14}				10.62	2.2	7.6	8.07	
S^{34}	-5.7	-5.3	-4.8		+1.5		+1.5	+1.5
MAJORS mg/l								
Bicarbonate	290	260	250	253	398	294	300	270
Sulfate	47	34	34	26	27	119	100	190
Potassium	5.9	5	7.4	4.6	6.9	11	11	18
Sodium	24	22	27	20	20	84	78	96
Chloride	9.9	8.9	8.5	8.7	6.2	35	34	61
Calcium	58	43	43	37	73	46	46	66
Silica	27	25	30	36	25	33	33	29
Magnesium	19	21	14	19	29	19	20	26
MINORS µg/l								
Barium	140	90	160	150	230	70	70	40
Boron	140	100	130	70	50	300	310	300
Iron	<10	<10	<10	59	310	28	<10	<10
Lithium	75	31	52	21	35	140	130	450
Strontium	420	270	480	250	420	780	860	1000
OTHERS								
Temp °C	37.0	27.5	36.0	23.0	27.5	34.0	35.5	32.9
pH	7.0	7.3	7.0	7.2	7.0	7.3	7.1	7.2

Note: All Data Provisional - Provided by U.S. Geological Survey

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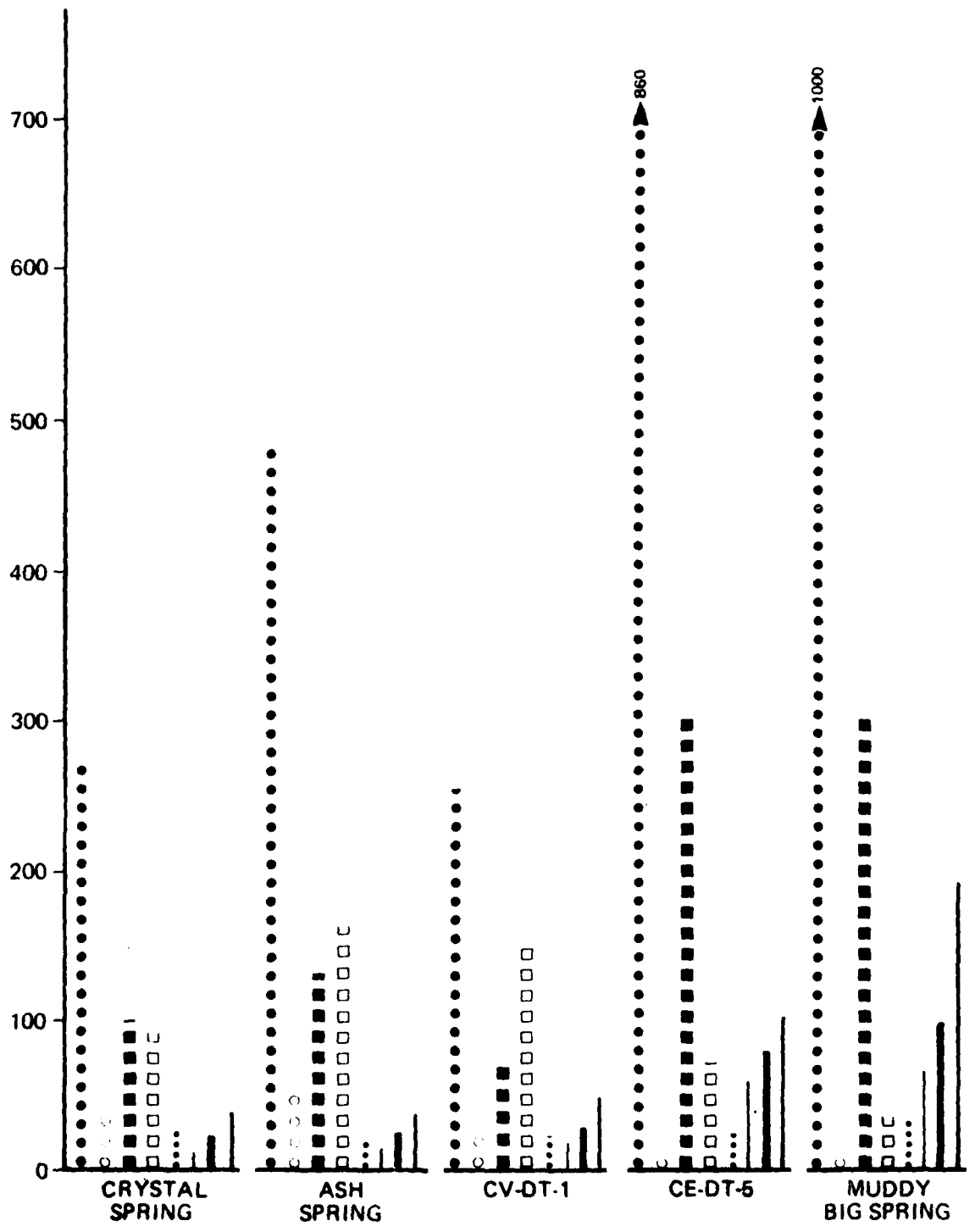
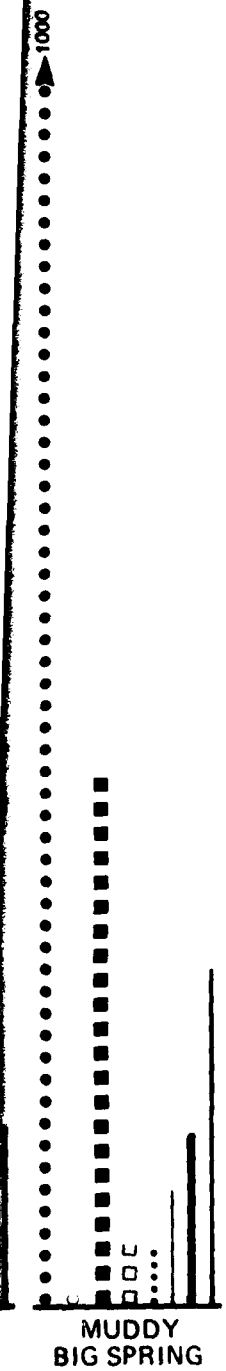
CHEMISTRY OF CARBONATE WELLS AND SELECTED REGIONAL SPRINGS

30 NOV 81 TABLE 4


700
600
500
400
300
200
100
0
860
1000
CRYSTAL SPRING
ASH SPRING
CV-DT-1
CE-DT-5
MUDDY BIG SPRING



EXPLANATION

- CHLORIDE
- SULFATE
- SODIUM
- MAGNESIUM

} MAJORS (mg/l)

- BARIUM
- BORON
- LITHIUM
- STRONTIUM

} MINORS (μg/l)

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TRENDS OF MAJOR AND MINOR CHEMICAL CONSTITUENTS

30 NOV 81

FIGURE 23

2

The provisional records for isotopic analysis for C^{13}/C^{12}, H^2/H^1, H^3, O^{18}/O^{16}, C^{14}, and S^{34} were received from the U.S. Geological Survey on 13 November 1981. A rigorous evaluation of this preliminary data has not been conducted. It is believed (U.S. Geology Survey 1981, personal communication) that the ground water at CE-DT-5 is much lighter in tritium (H^3) than sites upgradient in the flow system. These tritium values and other water-chemistry data suggest that the ground water at CE-DT-5 may be older water originating as under flow from the central part of the White River flow system.

Water samples for halocarbon analysis were collected during aquifer testing of previous Ertec carbonate exploration wells and during aquifer testing at CE-DT-5. Sample sites and results are shown in Table 5. These data also indicate that ground water at CE-DT-5 is older than that in the northern part of the flow system. The presence of minor amounts of halocarbons suggest, however, that there may be some mixing of the water with younger recharge water. The samples taken from Warm Spring and Baldwin Spring exhibit very low concentrations of F-11 (trichlorofluoromethane, CCl_3F, or "Freon-11") and trichlorethane and no F-12 (dichlorodifluoromethane, CCl_2F_2, or "Freon-12") or carbontetrachloride. Well CE-DT-5 also exhibits low F-11 and trichloroethane concentrations, but the presence of F-12 and carbontetrachloride in the water indicates that some mixing with younger recharge water is occurring. The source of some of this water may be the Sheep Range as proposed by Winograd and Friedman (1972).

SAMPLE NAME/NUMBER (DATE)	F-12	F-11	CH_3CCl_3	CCl_4	TOTAL HALOCARBON CONTENT, PPT
DL-DT-3 (12-10-80)	0.4[1] 1%[2]	0.6 1%	52.6 98%	0.1 0%	53.7
CV-DT-1 (1-15-81)	0.5 7%	0.7 9%	6.0 81%	0.2 2%	7.4
CE-DT-4[3] (12-23-80)	6.0 11%	9.2 17%	19.4 40%	16.8 30%	51.4
CE-DT-5 (8-30-81)	0.3 21%	0.08 6%	0.6 43%	0.4 29%	1.4
Muddy Big Spring (9-2-81)	0.2 11%	0.06 3%	1.6 86%	0 0%	1.9
Warm Spring (9-2-81)	0 0%	0.05 6%	0.8 94%	0 0%	0.85
Baldwin Spring (9-2-81)	0 0%	0.04 57%	0.03 43%	0 0%	0.07

1 Concentration in parts per trillion by weight, precision of method is ± 15% at 67% confidence level

2 Percentage of total halocarbon content

3 Sample contained large gas bubble

HALOCARBON ANALYSES FROM CARBONATE AQUIFER INVESTIGATION SITES

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TABLE 5

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4.0 CONCLUSIONS AND RECOMMENDATIONS

Based upon the preliminary results of the hydrologic investigation of well CE-DT-5, it is concluded that:

- Well CE-DT-5 is capable of a long-term, sustained yield in excess of 3400 gpm (218 l/s);
- Long-term, constant discharge testing of CE-DT-5 resulted in no detectable impacts upon either the discharge rate or water quality of the regional springs in the Muddy River Springs area;
- It is likely that some of the water pumped at CE-DT-5 was from deep in the regional carbonate aquifer system;
- The transmissivity of the regional carbonate aquifer at the CE-DT-4- and 5 site is in excess of 1.0×10^6 gpd/ft (1.24×10^4 m^2/day);
- The regional carbonate aquifer at the CE-DT-4- and 5 site is a confined system with a storativity estimated to be on the order of 1.0×10^{-4}; and
- With the exception of fluoride, the ground water in the regional carbonate aquifer at CE-DT-5 is within the maximum allowable water-quality standards for domestic water use in the state of Nevada.

CE-DT-5 was tested at the maximum rate the pumping unit would provide. It is likely that an even greater sustained well yield could be obtained with a larger pumping unit. If CE-DT-5 is to be used as a water-supply well and a larger pumping unit is used, it is recommended that additional testing and monitoring be performed to further quantify potential impacts.

Inspection of the pump bowl assembly after testing indicated extensive impeller damage. This was probably due to inflow of pieces of limestone dislodged from the borehole wall. If CE-DT-5 is to be used as a water-supply well, it is recommended that the existing borehole be cased with well screen installed

opposite the production zone(s). This may result in a decrease in well efficiency and discharge rate and it is therefore further recommended that additional studies be conducted to determine what well design should be used and what size pumping unit will provide the most efficient operation.

Although the preliminary results of the 30-day aquifer test indicated no impacts upon the Muddy River Springs, the long-term impacts of pumpage at CE-DT-5 are not certain. If CE-DT-5 is converted to a production well, it is recommended that a long-term monitoring program be implemented in the Muddy River Springs area.

5.0 REFERENCES CITED

Bierschenk, W. H., 1964, Determining well efficiency by multiple step-drawdown tests, International Association of Scientific Hydrology, publication 64.

Chow, V. T., 1964, Handbook of applied hydrology, New York: McGraw Hill.

Cooper, H. H., Jr., and Jacob, C. E., 1946, A generalized graphical method for evaluating formation constants and summarizing well field history, Transactions American Geophysical Union, 27, p. 526-534.

Desert Research Institute, 1980, (Revised 1981) Water rights in Nevada and Utah: An inventory within the MX area.

Eakin, 1962b, Ground-water appraisal of Cave Valley in Lincoln and White Pine Counties, Nevada, Nevada Department of Conservation and Natural Resources, Ground Water Resources Reconnaissance Series Report No. 13, p. 19.

_____, 1964, Ground-water appraisal of Coyote Spring and Kane Spring Valleys and Muddy River Springs area, Lincoln and Clark Counties, Nevada, Nevada Department of Conservation and Natural Resources, Water Resources -Reconnaissance Series Report, No. 25, p. 40.

_____, 1966, A regional interbasin ground-water system in the White River area, southeastern Nevada, Nevada Department of Conservation and Natural Resources, Bulletin No. 33, p. 251-271.

Ertec, 1981, MX siting investigation, water resources program, technical summary report, E-TR-52, unpublished report.

Ferris and others, 1962, Theory of aquifer tests, Geological Survey water-supply paper 1536-E, p. 173.

Gringarten, A. C., and Witherspoon, P. A., 1972, A method of analyzing pump test data from fractured aquifers, Professional Symposium Percolation Fissured Rock, International Society Rock Mechanics, Stuttgart, T3, p. B1-B9.

Hantush, M. S., 1956, Analysis of data from pumping tests in leaky aquifers, Transactions American Geophysical Union, v. 37, No. 6, p. 702-714.

Lennox, D. H., 1969, Readers comment on step-drawdown test, The Johnsons Drillers' Journal, January-February, p. 10-12.

Lohman, S. W., 1972, Ground-water hydraulics, U.S. Geological Survey Professional paper 708, p. 70.

Longwell, C. R., Pampeyan, E. H., Bowyer, B., and Roberts, R. J., 1979, Geology and mineral deposits of Clark County, Nevada, Nevada Bureau of Mines Bulletin No. 62, p. 218.

Mogg, J. L., 1968, Step-drawdown test needs critical review, The Johnson Drillers' Journal, July - August, p. 3-11.

Neuman, S. P., 1975, Analysis of pumping test data from anisotropic unconfined aquifers considering delayed gravity response, American Geophysical Union, v. 11, No. 2, p. 329-342.

Tschanz, C. M., and Pampeyan, E. H., 1970, Geology and mineral deposits of Lincoln County, Nevada, Nevada Bureau of Mines Bulletin 73, p. 188.

U.S. Geological Survey, 1981, Carson City, Nevada, personal communication, Mr. Allen Welch.

Winograd, I. J., and Friedman, I., 1972, Deuterium as a tracer of regional ground-water flow, southern Great Basin, Nevada and California, U.S. Geological Survey Bulletin, v. 83, p. 3691-3708.

Winograd, I. J., and Thordarson, W., 1975, Hydrogeologic and hydrochemical framework, south-central Great Basin, Nevada-California, with special reference to the Nevada Test Site, U.S. Geological Survey Professional Paper No. 712-C, p. 126.

Winograd, I. J., Thordarson, W., and Young, R. A., 1971, Hydrology of the Nevada Test Site and vicinity, southeastern Nevada, U. S. Geological Survey Open-File Report.

Woodburn, Wedge, Blakey, and Jeppson, Attorneys at Law, 1981, Analysis of Air Force applications for water in Nevada, PIIN F04704-80-D-0035, unpublished report.

APPENDIX A1.0

WELL SITING AND DRILLING INFORMATION

A1.0 WELL SITING AND DRILLING INFORMATION

A1.1 SITE-SELECTION CRITERIA

A number of cultural and hydrogeologic parameters were used in the selection of the CE-DT-4- and 5 carbonate test well site in Coyote Spring Valley. Drawing 1 shows the areas of exclusion and geologic and hydrostratigraphic conditions in the valley. This map is based upon the criteria discussed below and the interpretation of data compiled during field reconnaissance investigations.

A1.1.1 Cultural Criteria

A1.1.1.1 Land Ownership and Wilderness Status

Potential sites were limited to areas of public domain under the administration of the Bureau of Land Management which were not presently wilderness areas or under consideration as wilderness areas. This removed over half of the valley floor from siting considerations as well as most of the mountainous areas on the valley flanks.

The following areas were excluded:

- Desert National Wildlife Range;
- Delamar Mountains Wilderness Study Area;
- Meadow Valley Range Wilderness Study Area;
- Evergreen Wilderness Study Area;
- U.S. Fish and Wildlife Service No. 1, No. 2, and No. 3 Wilderness Study Areas;
- All areas within one-half mile of the Pahranagat National Wildlife Refuge; and
- Small areas of privately owned land, mostly along Pahranagat Wash (White River Channel).

A1.1.1.2 Existing and Pending Water Appropriations

All land within a 1-mile (1.6-km) radius of existing or pending surface or ground-water right points of diversion were excluded from further consideration. The locations of water rights were obtained from inventories conducted by the Desert Research Institute (1980) and Woodburn and others (1981). To avoid infringing upon water rights not identified by these inventories, 1-mile (1.6-km) setback distances were established from all known springs and wells and 0.25-mile (0.4-km) setback distances were established from all major stream channels and existing reservoirs. In addition, a 3-mile (5-km) exclusionary radius was applied to the regional carbonate discharge area in upper Moapa Valley.

A1.1.1.3 Access

Sites were limited to areas with access via existing roads. This criterion was further limited to roads capable of sustaining traffic from the heavy equipment used in well drilling and testing. This effectively excluded all areas more than 0.1 mile (0.2 km) from existing paved or graded roads.

A1.1.2 Hydrogeologic and Geologic Criteria

A1.1.2.1 Aquifers Present

As discussed in Section 1.3, the Paleozoic stratigraphic section in south-central Nevada was divided into 10 discrete hydrostratigraphic units. In the Coyote Spring Valley area, the most suitable units for ground-water development are the Monte Cristo Formation of Mississippian age, which correlates

with the Unit No. 8 aquifer, and Sultan Limestone of Devonian age, which corre lates with the Unit No. 6 aquifer. The Unit No. 7 aquitard (Pilot shale) is not know to be present in the area. Surficial exposures of Units No. 6 and No. 8 aquifers are delineated in Drawing 1 along with other identified aquifer and aquitard units. Potential drilling sites were restricted to areas adjacent to outcroppings of the favorable aquifer units.

A1.1.2.2 Structural Controls

The carbonate rocks in the study area have greatest potential for ground-water development where they have been extensively faulted and fractured. The major identified faults in Coyote Spring Valley are shown in Drawing 1. Geologic reconnaissance indicated intersecting fracture systems at the CE-DT-4- and 5 site.

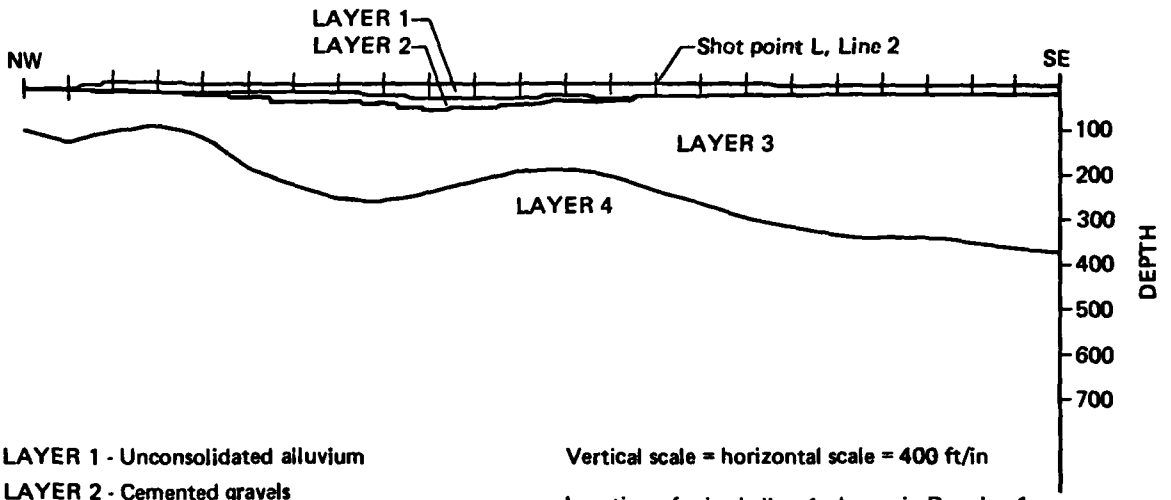
A1.1.2.3 Projected Drilling Depths

Due to the high cost of drilling large-diameter wells in carbonate rock, the thickness of alluvial cover and the depth of anticipated production zones are important criteria in well site selection. Because these criteria required site-specific field investigation, they were not evaluated until the drilling site had been tentatively selected. To determine the thickness of alluvial cover, two seismic refraction lines were run by Ertec. The location of these survey lines are shown in Drawing 1. Four distinct seismic layers were identified and are listed as follows.

Layer	Seismic Velocity (ft/sec)	Interpreted Lithology
1	1540	Unconsolidated alluvium
2	3800 - 4000	Cemented gravels
3	7600	Consolidated alluvium
4	15,000 - 17,000	Limestone

Figures A1-1 and A1-2 show the seismic refraction profiles. Based upon the survey, the depth to carbonate bedrock at the CE-DT-4- and 5 site was estimated to be from 234 to 526 feet (71 to 160 m). The irregularity of the profiles suggested the presence of numerous faults. Subsequent drilling at the site showed the initial interpretation of depth to bedrock to be significantly in error because bedrock was found in CE-DT-4 and 5 at 50 and 105 feet (15 and 32 m), respectively. This suggests that layer 3 may be altered limestone rather than consolidated alluvium.

The anticipated depth to target hydrostratigraphic aquifer units was assessed based on reconnaissance geologic mapping in the site vicinity. Based on this activity and published geologic information, it was anticipated that the target Monte Cristo Formation (aquifer Unit No. 8) and Sultan Limestone (aquifer Unit No. 6) would be found within 1000 feet (305 m) of land surface.



LAYER 1 - Unconsolidated alluvium
LAYER 2 - Cemented gravels
LAYER 3 - Altered limestone (?)
LAYER 4 - Limestone

Vertical scale = horizontal scale = 400 ft/in

Location of seismic line 1 shown in Drawing 1

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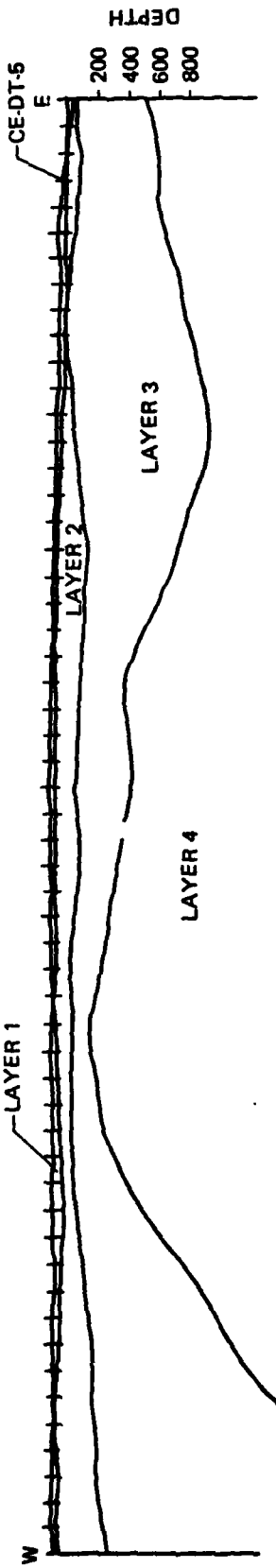
DEPARTMENT OF THE AIR FORCE
BMO/AFRCE-MX

SEISMIC REFRACTION PROFILE FOR LINE 1

30 NOV 81

FIGURE AII-1



Vertical scale = horizontal scale = 12,800 ft/in
Location of seismic line 2 shown in Drawing 1

LAYER 1 - Unconsolidated alluvium
LAYER 2 - Cemented gravels
LAYER 3 - Altered limestone (?)
LAYER 4 - Limestone

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SEISMIC REFRACTION PROFILE
FOR LINE 2

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FIGURE AII-2

A1.2 DRILLING HISTORY

A1.2.1 Drilling Program

Summarized below is a chronological description of activities during drilling and logging of CE-DT-5.

Date	Time	Activity
4/7/81	0700	Drilling contractor, equipment, and crew arrived at site and initiated drill-site preparation
4/13/81	2100	Commenced drilling - 26 inch borehole
	2300	Drilling depth - 10 feet
4/14/81	0321	Drilling depth - 20 feet
	0645	Drilling depth - 30 feet
	0945	Tripped out to clean bit; added collar and new mud hose fitting
	1045	Commenced drilling
	1145	Drilling depth - 40 feet
	1515	Drilling depth - 45 feet, very slow drilling
	1700	Tripped out to clean bit
	1745	Commenced drilling
	1815	Drilling depth - 50 feet
	2045	Drilling depth - 55 feet; penetrated lost circulation zone; mud viscosity 44 (Marsh-funnel viscosity in seconds); added lost circulation materials (LCM)
4/15/81	0500	Circulation restored; commenced drilling
	0603	Drilling depth - 60 feet
	0955	Drilling depth - 70 feet
	1145	Drilling depth - 80 feet
	1236	Drilling depth - 90 feet
	1350	Drilling depth - 95 feet; drilling stopped to add collar
	1445	Commenced drilling
	1505	Drilling depth - 100 feet
	1647	Drilling depth - 110 feet; very hard limestone at 105 feet
	1918(est)	Drilling depth - 120 feet
	2014	Stopped drilling at 121 feet; changed mud hose
	2110	Commenced drilling
4/16/81	0500	Drilling depth - 126 feet; lowered mud viscosity to 32 and tripped out of borehole; ran directional survey (<0.5° deviation)

Date	Time	Activity
4/16/81	0900	Started installing 20-inch ID, 312 wall, blank casing
4/17/81	0320	Casing installed; commenced pressure grouting
	0540	Grouting completed
4/20/81	1930	Tripped into borehole
	2300	Commenced drilling 17 1/2-inch borehole
4/21/81	0300	Drilling depth - 130 feet
	0345	Drilling depth - 140 feet
	0730	Drilling depth - 150 feet
	0800	Added collar; ran directional survey (<0.5° deviation)
	0852	Commenced drilling
	1140	Drilling depth - 160 feet
	1640	Drilling depth - 170 feet - tightly cemented zone, probably Anchor member of Monte Cristo limestone
	2225	Drilling depth - 180 feet
4/22/81	0029	Drilling depth - 185 feet; mud temperature increased; cuttings were warm to the touch
	0100	Stopped drilling at 188 feet; cleaned upper and lower mud pump valves
	0135	Commenced drilling
	0205	Drilling depth - 190 feet; drilling fluid temperature 78°F
	0635	Drilling depth - 204 feet; added collar and increased mud viscosity
	0800	Commenced drilling
	1115	Stopped drilling at 207 feet; serviced mud hose
	1118	Commenced drilling
	1230	Drilling depth - 210 feet
	1820	Drilling depth - 220 feet
	2230	Drilling depth - 230 feet
4/23/81	0148	Stopped drilling at 235 feet; ran directional survey (<0.5° deviation); increased mud viscosity
	0230	Commenced drilling
	0430	Drilling depth - 240 feet
	0850	Drilling depth - 250 feet
	1230	Drilling depth - 260 feet
	1735	Drilling depth - 270 feet; increased mud viscosity
	2015	Drilling depth - 280 feet
	2240	Drilling depth - 290 feet; mud viscosity at 36

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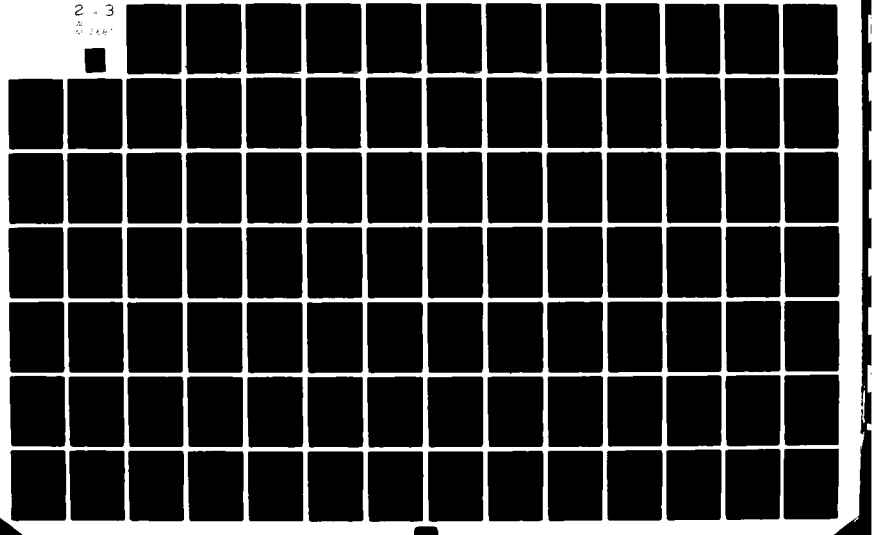

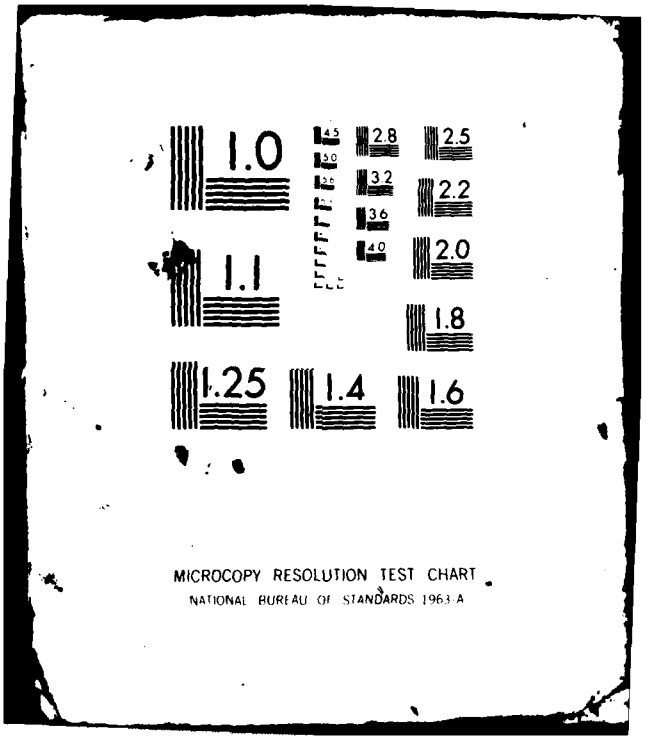
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

Date	Time	Activity
4/24/81	0130	Drilling depth - 300 feet
	0237	Drilling depth - 305 feet; some lost circulation; increased viscosity
	0340	Drilling depth - 310 feet
	0415	Penetrated lost circulation zone at 313 feet; increased mud viscosity
	0420	Complete loss of circulation; mud pit drained into borehole
	0720	Tripped out of borehole
	0850	Trip out completed; bit showed only minimal wear; drilling fluid level in borehole measured at 271 feet below land surface; tripped back in
	1030	Circulation restored
	1150	Drilling depth - 320 feet
	1420	Drilling depth - 330 feet
	1617	Drilling depth - 340 feet
	2115	Drilling depth - 350 feet
4/25/81	0010	Penetrated lost circulation zone at 357 feet; mud viscosity 32
	0620	Circulation restored
	0832(est)	Drilling depth - 360 feet
	1545	Drilling depth - 370 feet
	2145	Drilling depth - 380 feet
4/26/81	0122	Penetrated lost circulation zone at 384 feet; increased mud viscosity
	0515	Could not restore circulation; started drilling blind
	0630	Stopped drilling at 386 feet; sheared universal joint bolts on rotary drive line
	0700	Commenced drilling
	0725	Stopped drilling at 386 feet; increased mud viscosity
	1610	Mud viscosity at 200; still no circulation
	1840	Commenced drilling blind
	2130	Stopped drilling @ 387 feet
4/27/81	0100	Started tripping out
	0245	Completed tripping out; water-level sounding indicated dry borehole to 387 feet; inspection of bit showed what was believed to be siliceous matrix of brecciated limestone indicating drilling fluid being lost in a highly fractured zone
	1100	Began cementing off lost circulation zone

Date	Time	Activity
4/27/81	1150	Cementing completed - cement was sounded at 110 feet; viscosity at 38; tripped back into borehole to clear bridging
	1330	Penetrated bottom of cement at 240 feet; bridge collapsed and cement fell to bottom of borehole; cement allowed to set-up for 15 hours
4/28/81	0530	Commenced drilling; residual cement bridges were penetrated at 155 feet and 294 feet
	1330	Cement penetrated at 365 feet
	1410	Bedrock penetrated at 387 feet
4/29/81	0915	Drilling depth - 400 feet
	1145	Lost circulation zone penetrated at 402 feet
	1430	Commenced drilling blind
	1450	Circulation restored
	1540	Circulation lost; mud pit was drained into borehole; universal joint on drive assembly sheared and oil pump hose broke
	1820	Drilling depth - 404 feet; very slow drilling (0.5 feet/hr)
	2300	Lost circulation
	2400	Tripped out to change bits
4/30/81	0200(est)	Trip out completed; bit was very worn
	0500	Trip in completed; drill stem only went to 345 feet; old bit had lost gauge so borehole had to be reamed out with new bit
	0700	Reaming completed
	0925	Drilling depth 410 feet; mud viscosity at 55
	1425	Drilling depth-420 feet
	1910	Minor lost circulation at 426 feet
	2350	Drilling depth 430 feet
5/1/81	0210	Mud pump lost pressure at 434 feet; cleaned valves and tightened idler arm and universal joint bolts.
	0550	Drilling depth - 440 feet
	1130	Drilling depth - 450 feet
	1745	Drilling depth - 460 feet; mud viscosity at 45
	2110	Drilling depth - 470 feet
	2245	Drilling depth - 480 feet

Date	Time	Activity
5/2/81	0200	Drilling depth - 490 feet; harder drilling
	0550	Drilling depth - 400 feet; alternated very hard and soft formation
	0900	Drilling depth - 510 feet
	1150	Stopped drilling at 520 feet; ran direction survey (2° deviation at 520 feet, 17.5 feet of horizontal drift); mud viscosity at 40
	1400	Drilling depth - 530 feet
	1700	Drilling depth - 540 feet; mud viscosity at 40
	2110	Drilling depth - 550 feet
	2315	Drilling depth - 560 feet
5/3/81	0420	Drilling depth - 570 feet
	0540	Lost circulation zone penetrated at 571 feet; increased mud viscosity
	0850	Commenced drilling blind
	0915	Drilling depth - 572 feet; drilled hard and slow; no circulation; mud was being lost
	1155	Measured fluid level at 344 feet
	1540	Drilling depth - 577 feet; fluid level measured at 347.4 feet
	1840	Drilling depth - 580 feet; still drilled blind
5/4/81	0050	Drilling depth - 590 feet
	0540	Drilling depth - 595 feet; stopped drilling to run directional survey (2° deviation at 595 feet); fluid level measured at 347 feet
	0625	Commenced drilling
	0740	Drilling depth - 600 feet; still drilled blind
	1020	Drilling depth - 608 feet; tripped out and increased mud viscosity; added LCM and tried to regain circulation
	2350	Still no circulation
5/5/81	1035	Commenced drilling [illegible] lowly; drilled five minutes and cir[illegible]te for 15 minutes to clear cuttings
	1445	Drilling depth - 610 feet
	1640	Fluid level measured at 351.6 feet
5/6/81	0200	Drilling depth - 620 feet
	0850	Drilling depth - 628 feet; stopped drilling and started tripping out

Date	Time	Activity
5/6/81	1115	Trip out completed
	1220	Video logging crew arrived at site
	1300	Video logging began; water was too murky to log; added freshwater to borehole
	1415	Second video logging began
	1450	Video logging completed
	1530	Geophysical logging crew arrived
	1545	Logging began
	2200	Logging completed; caliper, SP&R, 3-D velocity, natural gamma, and induction log were run
5/7/81	1205	Third video logging began
	1500	Video logging completed; drilling and logging completed

A1.2.2 Bit Program

Summarized below is the bit schedule for drilling of CE-DT-5.

Size Inch	Type	Date In Time	Date Out Time	Footage	Hours
26	mill tooth	4/13/81 2015	4/16/81 0530	126	43
17.5	button	4/20/81 2144	4/26/81 2130	261	105
17.5	mill tooth	4/27/81 1220	4/29/81 2330	40	38
17.5	button	4/30/81 0550	5/6/81 0900	201	111

A1.2.3 Drilling Fluid Program

Summarized below is a chronological listing of the drilling fluid and mud viscosity additives used in CE-DT-5 for drilling and control of lost circulation. All mud products and a mud engineer were provided by NL Baroid. The information presented below is not intended to judge the performance of any Baroid product or personnel or to make any recommendation, implied or

otherwise, on the use thereof. The sole intent of the following program description is to provide documentation of drilling fluids and conditions.

Date	Time	Viscosity (seconds)	Depth (feet)	Additives Used
4/13/81	2100	35	Spud-in	4600 lbs. Aquagel 120 lbs. Quik-Trol 100 lbs. Soda Ash
4/14/81	0715	34	31	10 gal. Con Det
	1000	36	39	
	1400	38	42	
	1800	38	50	
	2040		62	80 lbs. Kwik-Seal 4650 lbs. Aquagel 100 lbs. Soda Ash 21 lbs. Quik-Trol
4/15/81	0500	44	62	50 lbs. Desco
	0630		62	100 lbs Soda Ash
	0950	55	70	
	1200	43	85	
	1750	38	112	
	1900	38	119	
4/16/81	0500	32	126	
4/21/81	0120	37	133	
	0330	34	140	
	0530	33	145	200 lbs. Soda Ash
	1030	32	158	14 lbs. Quik-Trol
	1200	29	161	1300 lbs. Aquagel 12 lbs. Quik-Trol
	2400	35	184	100 lbs. Soda Ash
4/22/81	0635	32	204	600 lbs. Aquagel
	0820		204	12 lbs. Quik-Trol 5 gal. Con Det
	0930	35	207	
	1230	36	210	
	1700	34	217	
	1820		220	500 lbs. Aquagel
	1930	34	222	
	2110		225	500 lbs Aquagel
	2300	36	229	
4/23/81	0148		235	60 lbs. Kwik-Seal 1 gal. Con Det
	0900	37	250	
	1650	31	265	

Date	Time	Viscosity (seconds)	Depth (feet)	Additives Used
	1735	33	270	500 lbs. Aquagel
	1910	34	277	300 lbs. Aquagel
				12 lbs. Quik-Trol
	2330	36	293	
4/24/81	0237	32	305	8 lbs. Quik-Trol
	0710		313	2000 lbs. Aquagel
				4 lbs. Quik-Trol
				120 lbs. Plug-Git
				100 lbs. Quik-Gel
				260 lbs. Kwik-Seal
	1120	37	316	
4/25/81	0010	32	357	
	0210		357	3400 lbs. Aquagel
				240 lbs. Plug-Git
				20 lbs. Kwik-Seal
	0740	39	358	
	1545		370	3500 lbs. Aquagel
				80 lbs. Kwik-Seal
				80 lbs. Multi-Seal
	1600	38	370	
4/26/81	0122	38	384	
	0415		384	3700 lbs. Aquagel
				360 lbs. Kwik-Seal
				40 lbs. Multi-Seal
	0730		386	7300 lbs. Aquagel
				2800 lbs. Hydrogel
				450 lbs. Quik-gel
				400 lbs. Multi Seal
				150 lbs. Quik-Gel
				10 lbs. Quik-Trol
				50 lbs. Soda Ash
	0925	200	386	
	1700		386	2600 lbs. Hydrogel
	2130		387	3300 lbs. Aquagel
				1500 lbs. Quik-Gel
				24 lbs. Quik-Trol
				240 lbs. Multi-Seal
				80 lbs. Hy-Seal
				120 lbs. Fibertex
				200 lbs. Kwik-Seal
4/27/81	0015		387	700 lbs. Quik-Gel

Date	Time	Viscosity (seconds)	Depth (feet)	Additives Used
4/28/81	1120	38	294	50 lbs. Soda Ash
	1400	36	365	
	1800	34	391	8 lbs. Quik-Trol
	2200	34	395	200 lbs. Quik-Gel
4/29/81	0835	33	400	14 lbs. Quik-Trol
	1000			500 lbs. Quik-Gel
	1145		405	3400 lbs. Quik-Gel
	1620			1800 lbs. Hydrogel
				20 lbs. Quik-Trol
				280 lbs. Fibertex
				160 lbs. Hy-Seal
4/30/81	0700	43	405	3250 lbs. Quik-Gel
				8 lbs. Quik-Trol
				100 lbs. Soda Ash
				120 lbs. Hy-Seal
	0900	55	409	
	1300	40	416	
	1500	39	422	
	1700	36	423	400 lbs. Fibertex
				250 lbs. Quik-Gel
	1900	40	426	
	1915	40	426	1250 lbs. Quik Gel
				900 lbs. Hydrogel
				100 lbs. Aquagel
				40 lbs. Hy-Seal
				40 lbs. Multi-Seal
				300 lbs. Fibertex
	2230	40	428	
5/1/81	0800	40	442	3750 lbs. Quik-Gel
				101 lbs. Quik-Trol
				160 lbs. Multi-Seal
	1130	67	450	
	1615	45	457	
	1700	43	458	
	2000		465	1000 lbs. Quik-Gel
	2400		485	
5/2/81	0900			80 lbs. Multi-Seal
	1130	40	520	1000 lbs. Quik-Gel
	1630	41	538	
	1730	40	542	750 lbs. Quik-Gel
	2030	44	548	
5/3/81	0945		572	4850 lbs. Quik-Gel
				40 lbs. Multi-Seal
				680 lbs. Kwik-Seal
				25 lbs. Soda Ash

Date	Time	Viscosity (seconds)	Depth (feet)	Additives Used
5/3/81	1645		578	750 lbs. Quik-Gel
	2400		589	900 lbs. Hydrogel
				80 lbs. Hy-Seal
				80 lbs. Fibertex
5/4/81	0000		589	1200 lbs. Quik-Gel
	1020		608	1400 lbs. Hydrogel
	1200		608	5300 lbs. Quik-Gel
	2015	212		2000 lbs. Hydrogel
				1900 lbs. Fibertex
				880 lbs. Kwik-Seal
				160 lbs. Hy-Seal
				6 lbs. Quik-Trol
				50 lbs. Caustic Soda
				100 lbs. Soda Ash
5/5/81	0000		608	2450 lbs. Quik-Gel
	1000			920 lbs. Hy-Seal
	1200		608	1250 lbs. Quik-Gel
	2400		617	100 lbs. Soda Ash

APPENDIX B1.0

AQUIFER TESTING DATA

B1.0 AQUIFER TESTING DATA

B1.1 AQUIFER TESTING HISTORY

Summarized below is a chronological description of activities during aquifer testing of well CE-DT-5, Coyote Spring Valley, T13S, R63E, Sec. 23dd.

Date	Time	Activity
6/19/81	0915	Pump test contractor, equipment, and crew arrived at site
	1330	Set up bailer and began bailing at CE-VF-2 using 4.5-inch diameter bailer; water level at 629 feet
	1500	Hit mud plug at 870 feet
6/20/81	0745	Resumed bailing
	1115	Changed to suction bucket to get very thick mud out of hole
	1900	Stopped bailing; sanded out approximately 170 feet
6/21/81	0815	Resumed bailing
	1610	Stopped bailing; sanded approximately 70 feet
6/22/81	0815	Took down bailing rig and moved to CE-DT-5
	1100	Static water level at CE-DT-5 at 352 feet
	1400	Commenced bailing with 6-inch bucket
	1830	Stopped bailing after 37 loads of slightly viscous, fetid, black mud.
6/23/81	0830	Resumed bailing
	1400	Accelerator cable broke
	1500	Resumed bailing
	1600	Stopped bailing after 36 loads
6/24/81	0900	Prepared to move back to CE-VF-2
	1030	Arrived at CE-VF-2
	1500	Commenced bailing; mud plug at 1060 feet; suction bucket used to get mud out
	1815	Stopped bailing

Date	Time	Activity
6/25/81	0815	Resumed bailing
	1220	Installed 3-inch Parshall Flumes with Stevens type F recorders at Warm Spring and Pederson Spring in upper Moapa Valley
	1815	Stopped bailing
6/26/81	0830	Resumed bailing
	0930	Installed flume at Baldwin spring
	1815	Stopped bailing; touched bottom at 1221 feet
6/27/81	0830	Resumed bailing; water was muddy; static water level at 617 feet
	1300	Stopped bailing, prepared for move to CE-DT-5
6/28/81	1000	Began preparation to run pump
	1330	Ran bowls down hole
6/29/81	0530	Installed in-hole discharge pipe, line shaft, airline, and 1 1/2-inch PVC pipe for transducer
	0900	Test engine arrived
	1100	Pump installation resumed
6/30/81	0700	Resumed installation of pump and turbine pump head assembly
7/1/81	0800	Set pump head; installed 160 feet of 10-inch x 20-foot discharge pipe
7/3/81	0800	Continued laying discharge pipe; preparation for aquifer test
	1430	Began well development; pump discharged 600 gpm with 6.5 feet of drawdown
	1600	Discharge increased to 1100 gpm with 13 feet of drawdown
	1700	Discharge increased to 1694 gpm with 26.5 feet of drawdown
	1800	Stopped development to switch to 12-inch orifice plate; Water was clear; 36°C; pH=7.05; EC=1180 umhos/cm.
	2130	Discharge increased to maximum 2727 gpm with 20 feet of drawdown; head gear had to be changed to 4:7 for the pump to deliver 3400 gpm
7/4/81	0010	Pump off; static water level at 352 feet
	1522	Continued development at 600 gpm with less than 1 foot of drawdown

Date	Time	Activity
	1643	Stopped pump to change orifice plates
	1720	Started pump; discharge 1220 gpm with 1.65 feet of drawdown
7/4/81	1834	Increased discharge to 1900 gpm; 5.7 feet of drawdown
	2320	Increased discharge to 2500 gpm; gray water discharged
	2340	Water clear; drawdown 11.9 feet
7/5/81	0344	Pump off; static water level at 348.5 feet
7/6/81	0830	Pulled pump head, driveline, and geardrive for installation of airline
	1300	490 feet of 1-inch galvanized pipe arrived to be installed
	1730	Completed setting galvanized pipe for transducer
7/8/81	0600	Pump crew arrived with new engine for pump
7/9/81	0100	Finished pump installation
	0415	Began pumping at 1269 gpm; water cleared after five minutes
	0450	Increased rate to 1928 gpm; 6.5 feet of drawdown
	0600	Increased rate to 2439 gpm; 11.9 feet of drawdown
	0645	Increased rate to 2967 gpm; 17.4 feet of drawdown
	0745	Increased rate to 3450 gpm; 24.4 feet of drawdown
	0923	Pump off, installed transducer down 1-inch airline
	2115	Began step drawdown test Step 1: discharged 598 gpm; 0.67 feet of drawdown
	2316	Step 2: discharged 1270 gpm; 2.70 feet of drawdown
7/10/81	0058	Step 3: discharge 1928 gpm; 6.20 feet of drawdown
	0214	Step 4: discharge 2575 gpm; 11.0 feet of drawdown
	0319	Step 5: discharge 3370 gpm; 20.5 feet of drawdown
	0457	Step 6: discharge 3980 gpm; 27.7 feet of drawdown
	0604	End of step drawdown; began recovery; removed driveline for repairs

Date	Time	Activity
7/11/81	0800	Installed driveline and prepared engine for pumping
	1400	Installed weir in channel to monitor infiltration of discharge
7/12/81	1041	Began constant discharge test at 3400 gpm
	1045	Weir was destroyed by force of water; water samples for pH, EC, temp. and HCO_3 were taken every five minutes for the first hour, every 30 minutes for the next three hours, every one hour until 12 hours into test, then once every 12 hours
7/13/81	1700	Engine stopped, cause unknown
	1758	Began constant discharge test 1b
7/14/81	1330	Engine stopped running
	1340	Restarted engine
	1355	Resumed constant discharge test
	1420	Engine stopped running; water temperature at maximum reading
7/15/81	1128	Started pumping to check engine temperature
	1245	Stopped engine
7/16/81	0910	Engine mechanic arrived on site
	1745	Engine mechanic departed site
7/17/81	0730	Engine mechanic arrived on site; replaced thermostat and water pump bowl and seal
	1000	Started engine
	1130	Stopped engine
	1313	Started constant discharge test 2
7/18/81	0430	Diesel line leaking
	0530	Stop test
	2054	Start constant discharge test 3
7/19/81	-	Pumping continued
7/20/81	0710	Engine mechanic on site to check engine temperature; ranging between 198-202°F, gauge showing 210°F+
7/21/81	0730	USGS representatives on site to take water samples for isotope analysis

Date	Time	Activity
7/22/81	1113	Pump stopped; gear drive locked up and stopped engine
7/24/81	0610	Survey crew arrived on site to survey elevations of wells and springs
	1010	Engine mechanic arrived on site to help replace gear drive and fan on engine
	1210	Pump crew shortened drive line to fit new gear drive; changed engine oil and filters
	1800	Engine started up to test gear drive
	1929	Started constant discharge test 4
7/25/81	-	Pumping continued
7/26/81	-	Pumping continued
7/27/81	-	Pumping continued
7/28/81	0730	Leak in fuel line; test stopped
7/29/81	0000	Worked on fuel lines
	1900	Started engine
	1930	Started constant discharge test 5
7/30/81	1710	Stopped pump; fuel leak
	2200	Engine started
	2220	Started constant discharge test 6a
7/31/81	1115	Engine mechanic on site to check engine; pumping continued
8/1/81	-	Pumping continued
8/2/81	-	Pumping continued
8/3/81	0640	Water sample taken for laboratory analysis; screen installed on radiator to keep bugs out
8/4/81	-	Pumping continued
8/5/81		Pumping continued
8/5/81	1020	Engine mechanic on site to check engine
8/6/81	-	Pumping continued; cleaned engine radiator

Date	Time	Activity
8/7/81	-	Pumping continued
	1400	Transducers at CE-DT-6 pulled out of the hole; unit sent back to Long Beach for repair
8/8/81	-	Pumping continued
8/9/81	-	Pumping continued
8/10/81		Pumping continued
	1930	Severe storm; pressure transducer unit at CE-DT-4, 5 shorted out; water level measurements taken with electric sounder
8/11/81	-	Pumping continued
8/12/81	1250	Water samples taken for laboratory analysis
	1505	Engine mechanic on site to check engine
	1511	Stopped test at direction of Air Force
8/13/81	0830	Engine mechanic on site; checked fuel pump, replaced tachometer, and hooked up thermister to check engine temperature; changed oil, filters, and lubed driveline
	1215	Received Air Force direction to restart test
	1245	Started constant discharge test 6b
8/14/81	-	Pumping continued
8/15/81	-	Pumping continued
8/16/81	-	Pumping continued
8/17/81	-	Pumping continued
8/18/81	-	Pumping continued
8/19/81	-	Pumping continued
8/20/81	-	Pumping continued
8/21/81	-	Pumping continued
8/22/81	-	Pumping continued
8/23/81	-	Pumping continued
8/24/81	-	Pumping continued

Date	Time	Activity
8/25/81	1057	Pump off; bearing on power take-off unit went out, heated, blew seal, caught on fire
	1530	Engine mechanic on site; power take-off unit to shop
8/26/81	0540	Replacement engine arrived on site
	1029	Started constant discharge test 7a with replacement engine;
8/27/81	1330	Engine mechanic arrived on site to install power take-off unit and service engine
	1420	Replacement engine stopped; safety shut-off
	1435	Started constant discharge test 7b
	1500	Replacement engine stopped again
8/28/81	1839	Started constant discharge test 8 with original engine at 3400 gpm
8/29/81	-	Pumping continued
8/30/81	-	Pumping continued
8/31/81	-	Pumping continued
	0710	Water sample taken for laboratory analysis
9/1/81	-	Pumping continued
9/2/81	-	Pumping continued
9/3/81	-	Pumping continued
9/4/81	-	Pumping continued
9/5/81	-	Pumping continued
9/6/81	-	Pumping continued
	2044	Back-up engine arrived on site (Cummins diesel)
9/7/81	-	Pumping continued
9/8/81	-	Pumping continued
9/9/81	-	Pumping continued
9/10/81	-	Pumping continued

Date	Time	Activity
9/11/81	-	Pumping continued
	0850	Engine mechanic arrived on site to service engine
	0914	Engine turned off and serviced
	1200	Constant discharge test 8 resumed
9/12/81	-	Pumping continued
9/13/81	-	Pumping continued
9/14/81	-	Pumping continued
	0700	Water sample taken for laboratory analsis
9/15/81	-	Pumping continued
9/16/81	-	Pumping continued
9/17/81	-	Pumping continued
9/18/81	-	Pumping continued
9/19/81	-	Pumping continued
9/20/81	-	Pumping continued
9/21/81	-	Pumping continued
9/22/81	-	Pumping continued
9/23/81	-	Pumping continued
9/24/81	-	Pumping continued
9/25/81	-	Pumping continued
9/26/81	-	Pumping continued
9/27/81	1800	Water sample taken for laboratory analysis
	2136	Constant discharge test completed; pressure transducer recorder unit jammed during recovery; water-level measurements obtained with electric sounder
9/28/81	0730	Disassemble equipment; continue monitoring recovery
9/29/81	0715	Pulled pump

APPENDIX B1.2

WATER LEVEL MEASUREMENTS-PUMPING WELL

WATER LEVEL MEASUREMENTS FOR PUMPING WELL CE-DT-5
LOCATION: 13S/63E-23D ELEVATION: 2169.03 FEET AMSL
INITIAL STATIC WATER LEVEL 348.5 FEET BELOW LAND SURFACE

DATE OF MEASUREMENT	TIME	WATER LEVEL BELOW LAND SURFACE-FEET	REMARKS
7-4-81	1030	348.5	
7-9-81	2115	-----	BEGIN STEP-DRAWDOWN
7-10-81	0021	352.0	1270 GPM
	0109	355.5	1928 GPM
	0222	360.3	2590 GPM
	0340	369.5	3380 GPM
	0542	377.1	3983 GPM
	0604	-----	PUMP OFF
	0607	349.5	
7-12-81	1040	349.2	STATIC WATER LEVEL
	1042	-----	PUMP ON
	1132	366.8	3414 GPM
	1900	367.4	
7-13-81	0800	367.6	
	1600	367.5	
	1700	-----	PUMP OFF
	1750	348.2	STATIC WATER LEVEL
	1757	-----	PUMP ON
	1826	364.4	3414 GPM
7-14-81	0700	365.4	
	1300	-----	PUMP OFF
7-17-81	1300	349.2	STATIC WATER LEVEL
	1312	-----	PUMP ON
	2100	363.0	3400 GPM (APPROXIMATE)
7-18-81	0500	363.0	
	0526	-----	PUMP OFF
	2050	349.2	STATIC WATER LEVEL
	2052	-----	PUMP ON
	2308	360.2	3400 GPM
7-19-81	0600	360.6	
	1900	360.6	
7-20-81	0700	360.9	
	2100	360.9	
7-21-81	0600	361.2	
	2000	361.5	
7-22-81	1000	361.4	
	1100	-----	PUMP OFF
7-24-81	1920	348.6	STATIC WATER LEVEL
	1925	-----	PUMP ON
	2228	361.2	3400 GPM
7-25-81	0600	361.5	
	1800	361.4	
7-26-81	0700	361.7	
	1900	361.6	
7-27-81	0700	361.9	
	1700	361.8	

PUMPING WELL CE-DT-5 (CONT.)

DATE OF MEASUREMENT	TIME	WATER LEVEL BELOW LAND SURFACE-FEET	REMARKS
7-28-81	0600	361.8	
	0717	-----	PUMP OFF
7-29-81	1900	349.2	STATIC WATER LEVEL
	1934	-----	PUMP ON
	1950	361.6	3400 GPM
7-30-81	1200	362.2	
	1713	362.2	
	1714	-----	PUMP OFF
	2220	349.2	STATIC WATER LEVEL
	2221	-----	PUMP ON
	2304	361.2	3395 GPM
7-31-81	0900	361.3	
	2000	361.4	
8-1-81	0700	361.5	
	1900	361.5	
8-2-81	0700	361.6	
	2000	361.5	
8-3-81	0800	361.7	
	2200	362.1	
8-4-81	0800	362.0	
	1900	362.0	
8-5-81	0700	362.2	
	2100	362.1	
8-6-81	0600	362.2	
	1900	362.0	
8-7-81	0600	362.2	
	1600	361.9	
8-8-81	0500	362.1	
	1500	361.8	
8-9-81	0500	362.2	
	1500	361.8	
8-10-81	0500	362.0	
	1800	362.1	
8-11-81	0910	362.2	
	1400	362.3	
8-12-81	0600	362.1	
	1310	362.1	
	1530	-----	PUMP OFF
8-13-81	1245	349.2	STATIC WATER LEVEL
8-13-81	1248	-----	PUMP ON
	1300	362.3	3400 GPM
	2200	362.2	
8-14-81	0630	362.0	
	2020	361.8	
8-15-81	0645	362.1	
	1630	361.9	
8-16-81	1930	361.9	
8-17-81	0715	361.9	
	1935	361.9	
8-18-81	0705	361.9	
	1950	362.1	
8-19-81	0715	362.1	
	2035	362.2	

PUMPING WELL CE-DT-5 (CONT.)

DATE OF MEASUREMENT	TIME	WATER LEVEL BELOW LAND SURFACE-FEET	REMARKS
8-20-81	0750	362.2	
	2015	362.3	
8-21-81	0750	362.4	
	2000	362.3	
8-22-81	0740	362.7	
	1930	362.4	
8-23-81	0810	362.5	
	2010	362.5	
8-24-81	0810	362.5	
	1600	362.5	
8-25-81	0750	362.5	
	1057	-----	PUMP OFF
8-26-81	1010	349.5	STATIC WATER LEVEL
	1029	-----	PUMP ON
	2230	359.0	2658 GPM
8-27-81	1420	-----	PUMP OFF

C E - D T- 5 AQUIFER TEST #8 DATA

(SINCO DATA CONVERSION)

START-TIME/DATE: 1839/08-28-81
STOP-TIME/DATE: 2139/09-28-81
DURATION OF TEST: 30 DAYS

TIME (MIN)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
0.00	349.50	0.00
0.07	353.01	3.51
0.13	356.33	6.83
0.20	358.67	9.17
0.27	359.19	9.69
0.33	358.77	9.27
0.40	357.70	8.20
0.47	356.41	6.91
0.53	355.62	6.12
0.60	355.36	5.86
0.67	355.45	5.95
0.73	355.48	5.98
0.80	355.43	5.93
0.87	355.99	6.49
1.00	356.55	7.05
1.07	357.23	7 73
1.13	357.54	8.04
1.20	357.41	7.91
1.27	357.51	8.01
1.33	358.21	8.71
1.40	358.89	9.39
1.47	358.64	9.14
1.53	358 71	9.21
1 60	358.95	9.45
1.67	359.29	9.79
1.73	359.43	9.93
1.80	359.30	9.80
1 87	359.36	9.86
1.93	359.42	9.92
2.00	359.44	9.94
2.07	359.61	10.11
2.13	359.61	10.11
2.20	359.67	10.17
2.27	359 68	10.18
2.33	359.65	10.15
2.40	359 69	10.19
2.47	359 77	10.27
2.53	359 91	10.41
2.66	360.18	10.68

CE-DT-5 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
2.67	360.47	10.97
2.73	360.54	11.04
2.80	360.43	10.93
2.87	360.29	10.79
2.93	360.10	10.69
3.00	360.10	10.69
4.00	360.23	10.73
5.00	360.10	10.69
6.00	360.26	10.76
7.00	360.18	10.68
8.00	360.27	10.77
9.00	360.30	10.80
10.00	360.24	10.74
11.00	360.24	10.74
12.00	360.33	10.83
13.00	360.25	10.75
15.00	360.31	10.81
16.00	360 24	10.74
17.00	360.33	10.83
18.00	360.33	10.83
19.00	360.29	10.79
20.00	360.31	10.81
21.00	360.24	10.74
22.00	360.29	10.79
23.00	360.33	10.83
24.00	360.26	10.76
25.00	360.31	10.81
26.00	360.29	10.79
27.00	360.26	10.81
28.00	360.29	10.79
29.00	360.29	10.79
30.00	360.26	10.76
35.00	360.29	10.79
40.00	360.30	10.80
45.00	360.27	10.77
50.00	360.26	10.76
55.00	360.39	10.89
60.00	360.32	10.82
65.00	360.34	10.84
70.00	360.41	10.91
75.00	360.49	11.00
80.00	360.52	11.02
85.00	360.47	10.97
90.00	360.52	11.02
95.00	360.48	10.98
100.00	360.51	11.01
105.00	360 44	10.94
110.00	360.48	10.98
115.00	360.44	10.94

CE-DT-5 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
120.00	360.52	11.02
125.00	360.50	11.00
130.00	360.47	10.97
135.00	360.52	11.02
140.00	360.54	11.04
145.00	360.52	11.02
150.00	360.54	11.04
155.00	360.50	11.00
160.00	360.53	11.03
186.00	360.57	11.07
196.00	360.61	11.11
211.00	360.57	11.07
226.00	360.61	11.11
241.00	360.60	11.10
256.00	360.66	11.16
271.00	360.66	11.16
286.00	360.66	11.16
301.00	360.64	11.14
316.00	360.74	11.24
381.00	360.84	11.34
441.00	360.78	11.28
501.00	360.81	11.31
561.00	360.72	11.22
621.00	360.78	11.28
681.00	360.72	11.22
741.00	360.74	11.24
801.00	360.81	11.31
861.00	360.78	11.28
921.00	360.71	11.21
981.00	360.77	11.27
1041.00	360.75	11.25
1101.00	360.75	11.25
1161.00	360.66	11.16
1221.00	360.70	11.20
1281.00	360.78	11.28
1341.00	360.79	11.29
1401.00	360.77	11.27
1461.00	360.80	11.30
1521.00	360.89	11.39
1581.00	360.93	11.43
1641.00	360.94	11.44
1701.00	360.93	11.43
1761.00	360.91	11.41
1821.00	360.91	11.41
1881.00	360.94	11.44
1941.00	360.99	11.49
2001.00	360.99	11.49
2061.00	360.96	11.46
2121.00	360.96	11.46

CE-DT-9 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
3181.00	360.88	11.38
3241.00	360.91	11.41
3301.00	360.84	11.34
3361.00	360.86	11.36
3421.00	360.85	11.35
3481.00	360.88	11.38
3541.00	360.87	11.37
3601.00	360.82	11.32
3661.00	360.88	11.38
3721.00	360.89	11.39
3781.00	360.84	11.34
3841.00	360.88	11.38
3901.00	360.81	11.31
3961.00	360.93	11.43
4021.00	360.96	11.46
4081.00	361.02	11.52
4141.00	360.96	11.46
4201.00	361.00	11.50
4261.00	361.09	11.59
4321.00	361.07	11.57
4381.00	361.12	11.62
4441.00	361.05	11.55
4501.00	361.09	11.59
4561.00	361.05	11.55
4621.00	361.12	11.62
4681.00	361.00	11.50
4741.00	359.98	11.48
4801.00	361.01	11.51
4861.00	361.05	11.55
4921.00	361.07	11.57
4981.00	361.00	11.50
5041.00	361.02	11.52
5101.00	359.99	11.49
5161.00	359.96	11.46
5221.00	361.07	11.57
5281.00	361.02	11.52
5341.00	359.96	11.46
5401.00	361.05	11.55
5461.00	361.05	11.55
5521.00	361.00	11.50
5581.00	361.09	11.59
5641.00	361.10	11.60
5701.00	361.02	11.52
5761.00	361.19	11.69
5821.00	361.19	11.69
5881.00	361.21	11.71
5941.00	361.18	11.68
6001.00	361.20	11.70
6061.00	361.20	11.70

CE-CT-5 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
5121.00	361.12	11.62
5181.00	361.07	11.57
5241.00	361.01	11.51
5301.00	361.05	11.55
5361.00	361.12	11.62
5421.00	361.03	11.53
5481.00	361.03	11.53
5541.00	361.01	11.51
5601.00	360.96	11.46
5661.00	361.09	11.59
5721.00	361.03	11.53
5781.00	361.08	11.58
5841.00	361.08	11.58
5901.00	361.09	11.59
5961.00	361.03	11.53
6021.00	361.09	11.59
6081.00	361.15	11.65
6141.00	361.19	11.69
6201.00	361.22	11.72
6261.00	361.22	11.72
6321.00	361.27	11.77
6381.00	361.26	11.76
6441.00	361.25	11.75
6501.00	361.25	11.75
6561.00	361.23	11.73
6621.00	361.07	11.57
6681.00	361.02	11.52
6741.00	361.03	11.53
6801.00	361.06	11.56
6861.00	361.05	11.55
6921.00	361.05	11.55
6981.00	361.12	11.62
7041.00	361.05	11.55
7101.00	361.03	11.53
7161.00	361.09	11.59
7221.00	361.09	11.59
7281.00	361.05	11.55
7341.00	361.14	11.64
7401.00	361.15	11.65
7461.00	361.14	11.64
7521.00	361.20	11.70
7581.00	361.16	11.66
7641.00	361.29	11.79
7701.00	361.25	11.75
7761.00	361.32	11.82
7821.00	361.26	11.76
7881.00	361.26	11.76
7941.00	361.26	11.76
8001.00	361.26	11.76

OE-DT-5 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
8061.00	361.09	11.59
8121.00	361.09	11.59
8181.00	361.05	11.55
8241.00	361.12	11.62
8301.00	361.06	11.56
8361.00	361.01	11.51
8421.00	361.06	11.56
8481.00	361.13	11.63
8541.00	361.09	11.59
8601.00	361.15	11.65
8661.00	361.11	11.61
8721.00	361.11	11.61
8781.00	361.06	11.56
8841.00	361.13	11.63
8901.00	361.16	11.66
8961.00	361.10	11.60
9021.00	361.27	11.77
9081.00	361.26	11.76
9141.00	361.32	11.82
9201.00	361.26	11.76
9261.00	361.29	11.79
9321.00	361.34	11.84
9381.00	361.28	11.78
9441.00	361.25	11.75
9501.00	361.21	11.71
9561.00	361.21	11.71
9621.00	361.08	11.58
9681.00	361.05	11.55
9741.00	361.05	11.55
9801.00	361.11	11.61
9861.00	361.15	11.65
9921.00	361.15	11.65
9981.00	361.22	11.72
10041.00	361.21	11.71
10101.00	361.30	11.80
10161.00	361.27	11.77
10221.00	361.25	11.75
10281.00	361.22	11.72
10341.00	361.23	11.73
10401.00	361.29	11.79
10461.00	361.18	11.68
10521.00	361.28	11.78
10581.00	361.27	11.77
10641.00	361.25	11.75
10701.00	361.25	11.75
10761.00	361.23	11.73
10821.00	361.28	11.78
10881.00	361.32	11.82
10941.00	361.21	11.71

CE-OT-3 AQUIFER TEST #3 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
11001.00	361.16	11.66
11061.00	361.14	11.64
11121.00	361.05	11.55
11181.00	361.05	11.55
11241.00	361.05	11.55
11301.00	361.18	11.68
11361.00	361.13	11.63
11421.00	361.11	11.61
11481.00	------	-----
11541.00	361.12	11.62
11601.00	361.13	11.63
11661.00	361.21	11.71
11721.00	361.25	11.75
11781.00	361.27	11.77
11841.00	361.30	11.80
11901.00	361.30	11.80
11961.00	361.20	11.70
12021.00	361.26	11.76
12081.00	361.22	11.72
12141.00	361.23	11.73
12201.00	361.27	11.77
12261.00	361.16	11.66
12321.00	361.30	11.80
12381.00	361.22	11.72
12441.00	361.17	11.67
12501.00	361.14	11.64
12561.00	361.09	11.59
12621.00	361.07	11.57
12681.00	361.07	11.57
12741.00	361.07	11.57
12801.00	361.02	11.52
12861.00	361.01	11.51
12921.00	361.13	11.63
12981.00	361.29	11.79
13041.00	361.19	11.69
13101.00	361.33	11.83
13161.00	361.17	11.67
13221.00	361.16	11.66
13281.00	361.10	11.60
13341.00	361.14	11.64
13401.00	361.19	11.69
13461.00	361.27	11.77
13521.00	361.27	11.77
13581.00	361.22	11.72
13641.00	361.19	11.69
13701.00	361.25	11.75
13761.00	361.28	11.78
13821.00	361.21	11.71
13881.00	361.29	11.79

SE-DT-5 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
13941.00	361.19	11.69
14001.00	361.28	11.78
14061.00	361.23	11.73
14121.00	361.17	11.67
14181.00	361.13	11.63
14241.00	361.01	11.51
14301.00	361.02	11.52
14361.00	361.08	11.58
14421.00	361.02	11.52
14481.00	361.06	11.56
14541.00	361.12	11.62
14601.00	361.14	11.64
14661.00	361.25	11.75
14721.00	361.16	11.66
14781.00	361.14	11.64
14841.00	361.13	11.63
14901.00	361.16	11.66
14961.00	361.19	11.69
15021.00	361.19	11.69
15081.00	361.13	11.63
15141.00	361.16	11.66
15201.00	361.15	11.65
15261.00	361.21	11.71
15321.00	361.14	11.64
15381.00	361.03	11.53
15441.00	361.08	11.58
15501.00	361.01	11.51
15561.00	361.03	11.53
15621.00	361.08	11.58
15681.00	361.02	11.52
15741.00	361.03	11.53
15801.00	361.02	11.52
15861.00	361.00	11.50
15921.00	361.08	11.58
15981.00	361.10	11.60
16041.00	361.08	11.58
16101.00	361.05	11.55
16161.00	361.07	11.57
16221.00	361.06	11.56
16281.00	361.06	11.56
16341.00	360.99	11.49
16401.00	361.08	11.58
16461.00	361.07	11.57
16521.00	361.13	11.63
16581.00	361.13	11.63
16641.00	361.20	11.70
16701.00	361.27	11.77
16761.00	361.17	11.67
16821.00	361.13	11.63

CE-DT-5 AQUIFER TEST #3 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
16881.00	361.09	11.59
16941.00	361.08	11.58
17001.00	361.08	11.58
17061.00	361.07	11.57
17121.00	361.02	11.52
17181.00	360.96	11.46
17241.00	361.07	11.57
17301.00	361.05	11.55
17361.00	361.06	11.56
17421.00	361.06	11.56
17481.00	361.03	11.53
17541.00	361.03	11.53
17601.00	361.12	11.62
17461.00	361.07	11.57
17721.00	361.07	11.57
17781.00	361.12	11.62
17841.00	361.06	11.56
17901.00	361.05	11.55
17961.00	361.10	11.60
18021.00	361.07	11.57
18081.00	361.13	11.63
18141.00	361.08	11.58
18201.00	361.01	11.51
18261.00	361.14	11.64
18321.00	361.03	11.53
18381.00	361.02	11.52
18441.00	361.05	11.55
18501.00	360.93	11.43
18561.00	361.03	11.53
18621.00	360.94	11.44
18681.00	361.06	11.56
18741.00	361.05	11.55
18801.00	361.10	11.60
18861.00	361.21	11.71
18921.00	361.37	11.87
18981.00	361.08	11.58
19041.00	361.05	11.55
19101.00	361.03	11.53
19161.00	361.03	11.53
19221.00	361.07	11.57
19281.00	361.02	11.52
19341.00	361.03	11.53
19401.00	361.09	11.59
19461.00	361.12	11.62
19521.00	361.13	11.63
19581.00	361.03	11.53
19599.23	361.06	11.56
19599.30	361.10	11.60
19599.37	361.08	11.58

CE-DT-9 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
19599.43	360.92	11.42
19599.50	360.68	11.18
19599.56	360.05	10.55
19599.63	358.79	9.29
19599.70	356.75	7.25
19599.77	355.23	5.73
19599.83	351.42	1.92
19599.90	348.47	-1.03
19599.97	345.76	-3.74
19600.00	346.67	-2.83
19600.10	347.56	-1.94
19600.17	348.82	-0.68
19600.23	347.67	-1.83
19600.30	347.88	-1.62
19600.37	348.17	-1.33
19600.43	348.32	-1.18
19600.50	348.42	-1.08
19600.56	348.68	-0.82
19600.63	348.86	-0.64
19600.70	348.98	-0.52
19600.77	349.13	-0.37
19600.83	349.24	-0.26
19600.90	349.38	-0.12
19600.97	349.42	-0.08
19601.00	349.49	-0.01
19601.12	349.56	0.06
19601.18	349.60	0.10
19601.25	349.63	0.13
19601.32	349.63	0.13
19601.38	349.60	0.10
19601.45	349.60	0.10
19601.52	349.58	0.08
19601.58	349.60	0.10
19601.65	349.58	0.08
19601.72	349.58	0.08
19601.78	349.58	0.08
19601.85	349.60	0.10
19601.92	349.60	0.10
19601.98	349.58	0.08
19602.00	349.60	0.10
19602.12	349.58	0.08
19602.18	349.58	0.06
19602.25	349.58	0.08
19602.32	349.60	0.10
19602.38	349.58	0.08
19602.45	349.58	0.08
19602.52	349.60	0.10
19602.58	349.58	0.08
19602.65	349.58	0.08

CE-DT-5 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
19602.72	349.58	0.08
19602.78	349.60	0.10
19602.85	349.58	0.08
19602.92	349.60	0.10
19603.00	349.59	0.09
19604.00	349.60	0.10
19605.00	349.58	0.08
19606.00	349.58	0.08
19607.00	349.57	0.07
19608.00	349.55	0.05
19612.00	349.55	0.05
19616.00	349.55	0.05
19620.00	349.55	0.05
19624.00	349.55	0.05
19628.00	349.55	0.05
19632.00	349.55	0.05
19636.00	349.55	0.05
19640.00	349.55	0.05
19644.00	349.55	0.05
19648.00	349.55	0.05
19652.00	349.53	0.03
19656.00	349.55	0.05
19660.00	349.51	0.01
19664.00	349.55	0.55
19668.00	349.52	0.02
19672.00	349.53	0.03
19676.00	349.51	0.01
19680.00	349.51	0.01
19684.00	349.53	0.03
19700.00	349.52	0.02
19715.00	349.51	0.01
19730.00	349.49	-0.01
19745.00	349.49	-0.01
19760.00	349.49	-0.01
19763.77	349.49	-0.01
19763.83	349.49	-0.01
19763.90	349.49	-0.01
19763.97	349.49	-0.01
19764.00	349.52	0.02
19764.10	353.62	4.12
19764.17	357.69	8.19
19764.23	361.17	10.67
19764.27	359.89	10.39
19764.37	358.81	9.31
19764.43	357.55	8.05
19764.50	356.38	6.88
19764.56	355.79	6.29
19764.63	355.61	6.11
19764.70	355.72	6.22

CE-DT-5 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
19764.77	355.70	6.20
19764.83	355.68	6.18
19764.90	355.61	6.11
19764.97	355.64	6.14
19765.00	355.64	6.14
19765.10	355.57	6.07
19765.17	355.66	6.16
19765.23	356.26	6.76
19765.30	357.72	8.22
19765.37	359.09	9.59
19765.43	359.76	10.26
19765.50	359.74	10.24
19765.56	359.69	10.19
19765.63	359.60	10.10
19765.70	359.88	10.38
19765.77	360.26	10.76
19765.83	360.60	11.10
19765.90	360.81	11.31
19765.97	360.80	11.31
19766.00	360.84	11.34
19766.08	360.81	11.31
19766.15	360.91	11.41
19766.22	360.84	11.34
19766.28	360.93	11.43
19766.35	360.84	11.34
19766.42	360.84	11.34
19766.48	360.88	11.38
19766.55	360.81	11.31
19766.62	360.86	11.38
19766.68	360.86	11.38
19766.75	360.95	11.45
19766.82	360.81	11.31
19766.88	360.70	11.20
19766.95	360.65	11.15
19767.00	360.46	10.96
19767.08	360.25	10.75
19767.15	360.23	10.73
19767.22	360.16	10.66
19767.28	360.16	10.66
19767.35	360.23	10.73
19767.42	360.23	10.73
19767.48	360.23	10.73
19767.55	360.23	10.73
19767.62	360.23	10.73
19767.68	360.16	10.66
19767.75	360.27	10.77
19767.82	360.18	10.68
19767.88	360.27	10.77
19767.95	360.16	10.66

CE-DT-5 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
19768.00	360.25	10.75
19768.06	360.20	10.70
19768.13	360.27	10.77
19768.20	360.23	10.73
19768.26	360.20	10.70
19768.33	360.27	10.77
19768.40	360.30	10.80
19768.47	360.25	10.75
19768.53	360.20	10.70
19768.60	360.34	10.84
19768.67	360.25	10.75
19768.73	360.25	10.75
19768.81	360.25	10.75
19768.86	360.37	10.87
19768.93	360.27	10.77
19768.98	360.30	10.80
19769.00	360.32	10.82
19769.12	360.36	10.86
19774.00	360.22	10.72
19815.00	360.24	10.74
19875.00	360.29	10.79
19935.00	360.30	10.80
19995.00	360.29	10.79
20055.00	360.23	10.73
20121.00	360.29	10.79
20181.00	360.26	10.76
20241.00	360.26	10.76
20301.00	360.37	10.87
20361.00	360.30	10.80
20421.00	360.26	10.76
20481.00	360.24	10.74
20541.00	360.25	10.75
20601.00	360.25	10.75
20601.00	360.30	10.80
20721.00	360.26	10.76
20781.00	360.30	10.80
20841.00	360.33	10.83
20901.00	360.36	10.86
20961.00	360.38	10.88
21021.00	360.32	10.82
21081.00	360.39	10.89
21141.00	360.40	10.90
21201.00	360.31	10.81
21261.00	360.32	10.82
21321.00	360.25	10.75
21381.00	360.33	10.83
21441.00	360.27	10.77
21501.00	360.26	10.76
21561.00	360.29	10.79

CE-DT-5 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
21621.00	360.57	11.07
21681.00	360.39	10.89
21741.00	360.33	10.83
21801.00	360.33	10.83
21861.00	360.34	10.84
21921.00	360.40	10.90
21981.00	360.29	10.79
22041.00	360.31	10.81
22101.00	360.30	10.80
22161.00	360.27	10.77
22221.00	360.26	10.76
22281.00	360.26	10.76
22341.00	360.19	10.69
22401.00	360.41	10.91
22461.00	360.34	10.84
22521.00	360.39	10.89
22581.00	360.30	10.80
22641.00	360.30	10.80
22701.00	360.22	10.32
22761.00	360.18	10.68
22821.00	360.19	10.69
22881.00	360.30	10.80
22941.00	360.24	10.74
23001.00	360.17	10.67
23061.00	360.10	10.60
23121.00	360.25	10.75
23181.00	360.30	10.80
23241.00	360.38	10.88
23301.00	360.36	10.86
23361.00	360.30	10.80
23421.00	360.43	10.93
23481.00	360.32	10.82
23541.00	360.29	10.79
23601.00	360.25	10.75
23661.00	360.33	10.83
23721.00	360.19	10.69
23781.00	360.27	10.77
23841.00	360.34	10.84
23901.00	360.36	10.86
23961.00	360.23	10.73
24021.00	360.39	10.89
24081.00	360.19	10.69
24141.00	360.25	10.75
24201.00	360.27	10.77
24261.00	360.18	10.68
24321.00	360.32	10.82
24381.00	360.31	10.81
24441.00	360.30	10.80
24501.00	360.24	10.74

CE-DT-5 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
24561.00	360.25	10.75
24621.00	360.37	10.87
24681.00	360.37	10.87
24741.00	360.37	10.87
24801.00	360.41	10.91
24861.00	360.53	11.03
24921.00	360.52	11.02
24981.00	360.44	10.94
25041.00	360.44	10.94
25101.00	360.44	10.94
25161.00	360.41	10.91
25221.00	360.38	10.88
25281.00	360.39	10.89
25341.00	360.39	10.89
25401.00	360.34	10.84
25461.00	360.26	10.76
25521.00	360.30	10.80
25581.00	360.31	10.81
25641.00	360.23	10.73
25701.00	360.27	10.77
25761.00	360.31	10.81
25821.00	360.24	10.74
25881.00	360.26	10.76
25941.00	360.23	10.73
26001.00	360.27	10.77
26061.00	360.27	10.77
26121.00	360.36	10.86
26181.00	360.41	10.91
26241.00	360.45	10.95
26301.00	360.43	10.93
26361.00	360.39	10.89
26421.00	360.48	10.98
26481.00	360.48	10.98
26541.00	360.41	10.91
26601.00	360.40	10.90
26661.00	360.32	10.82
26721.00	360.44	10.94
26781.00	360.34	10.84
26841.00	360.41	10.91
26901.00	360.37	10.87
26961.00	360.31	10.81
27021.00	360.33	10.83
27081.00	360.33	10.83
27141.00	360.25	10.75
27021.00	360.25	10.75
27261.00	360.31	10.81
27321.00	360.26	10.76
27321.00	360.25	10.75
27441.00	360.37	10.87

CE-DT-3 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
27501.00	360.44	10.94
27561.00	360.45	10.95
27621.00	360.37	10.87
27681.00	360.47	10.97
27741.00	360.57	11.07
27801.00	360.50	11.00
27861.00	360.54	11.04
27921.00	360.51	11.01
27981.00	360.51	11.01
28041.00	360.51	11.01
28101.00	360.50	11.00
28161.00	360.50	11.00
28221.00	360.43	10.93
28281.00	360.40	10.90
28341.00	360.32	10.82
28401.00	360.36	10.86
28461.00	360.36	10.86
28521.00	360.33	10.83
28581.00	360.31	10.81
28641.00	360.24	10.74
28701.00	360.37	10.87
28761.00	360.46	10.96
28821.00	360.38	10.88
28881.00	360.37	10.87
28941.00	360.39	10.89
29001.00	360.43	10.93
29061.00	360.46	10.96
29121.00	360.48	10.98
29181.00	360.51	11.01
29241.00	360.48	10.98
29301.00	360.54	11.04
29361.00	360.47	10.97
29421.00	360.51	11.01
29481.00	360.53	11.03
29541.00	360.52	11.02
29601.00	360.40	10.90
29661.00	360.40	10.90
29721.00	360.41	10.91
29781.00	360.34	10.84
29841.00	360.29	10.79
29901.00	360.29	10.79
29961.00	360.33	10.83
30021.00	360.33	10.83
30081.00	360.33	10.83
30141.00	360.31	10.81
30201.00	360.30	10.80
30261.00	360.30	10.80
30321.00	360.29	10.79
30381.00	360.33	10.83

CE-DT-5 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
30441.00	360.38	10.88
30501.00	360.44	10.94
30561.00	360 44	10.94
30621.00	360.41	10.91
30681.00	360.43	10.93
30741.00	360.47	10.97
30801.00	360.51	11.01
30861.00	360.46	10.96
30921.00	360.54	11.04
30981.00	360.50	11.00
31041.00	360.47	10.97
31101.00	360.41	10.91
31161.00	360.40	10.90
31221 00	360.41	10.91
31281.00	360.27	10.77
31341.00	360.31	10.81
31401.00	360.29	10.79
31461.00	360 30	10.80
31521.00	360 20	10.70
31581.00	360 36	10.86
31641.00	360.33	10.83
31701.00	360.26	10.76
31761.00	360.26	10 76
31821 00	360 23	10.73
31881.00	360.39	10.89
31941.00	360.38	10.88
32001.00	--	--
32061.00	360.38	10.88
32121.00	--	--
32181.00	--	--
32241.00	--	--
32301 00	--	--
32361.00	--	--
32421.00	--	--
32481.00	360.51	11.01
32541.00	360.43	10.93
32601.00	360.30	10.80
32661.00	360.37	10.87
32721.00	360.33	10.83
32781.00	360.39	10.89
32841.00	360.29	10.79
32901.00	360.20	10.70
32961.00	360.29	10 79
33021.00	360.31	10.81
33081.00	360.31	10.81
33141.00	360.31	10.81
33201.00	360 32	10.82
33261.00	360 20	10.80
33321.00	360.33	10 83

CE-DT-5 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
33381.00	360.32	10.82
33441.00	360.36	10.86
33501.00	360.43	10.93
33561.00	360.47	10.97
33621.00	360.43	10.93
33681.00	360.46	10.96
33741.00	360.61	11.11
33801.00	360.49	10.99
33861.00	360.45	10.95
33921.00	360.47	10.97
33981.00	360.50	11.00
34041.00	360.46	10.96
34101.00	360.40	10.90
34161.00	360.36	10.86
34221.00	360.36	10.86
34281.00	360.27	10.77
34341.00	360.27	10.77
34401.00	360.31	10.81
34461.00	360.30	10.80
34521.00	360.41	10.91
34581.00	360.41	10.91
34641.00	360.34	10.84
34701.00	360.38	10.88
34761.00	360.34	10.84
34821.00	360.32	10.82
34881.00	360.34	10.84
34941.00	360.32	10.82
35001.00	360.45	10.95
35061.00	360.47	10.97
35121.00	360.51	11.01
35181.00	360.47	10.97
35241.00	360.49	10.99
35301.00	360.61	11.11
35361.00	360.50	11.00
35421.00	360.45	10.95
35481.00	360.43	10.93
35541.00	360.37	10.87
35601.00	360.41	10.91
35661.00	360.44	10.94
35721.00	360.39	10.89
35781.00	360.32	10.82
35841.00	360.30	10.80
35901.00	360.36	10.86
35961.00	360.32	10.82
36021.00	360.38	10.88
36081.00	360.39	10.89
36141.00	360.39	10.89
36201.00	360.38	10.88
36261.00	360.37	10.87

CE-DT-5 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
36321.00	360.44	10.94
36381.00	360.31	10.81
36441.00	360.31	10.81
36501.00	360.34	10.84
36561.00	360.37	10.87
36621.00	360.38	10.88
36681.00	360.38	10.88
36741.00	360.41	10.91
36801.00	360.38	10.88
36861.00	360.44	10.94
36921.00	360.44	10.94
36981.00	360.43	10.93
37041.00	360.46	10.96
37101.00	360.43	10.93
37161.00	360.32	10.82
37221.00	360.33	10.83
37281.00	360.36	10.86
37341.00	360.32	10.82
37401.00	360.36	10.86
37461.00	360.37	10.87
37521.00	360.36	10.86
37581.00	360.37	10.87
37641.00	360.38	10.88
37701.00	360.39	10.89
37761.00	360.41	10.91
37821.00	360.37	10.87
37881.00	360.39	10.89
37941.00	360.39	10.89
38001.00	360.38	10.88
38061.00	360.34	10.84
38121.00	360.39	10.89
38181.00	360.58	11.08
38241.00	360.52	11.02
38301.00	360.59	11.09
38361.00	360.48	10.98
38421.00	360.52	11.02
38481.00	360.52	11.02
38541.0	360.47	10.97
38601.00	360.37	10.87
38661.00	360.38	10.88
38721.00	360.38	10.88
38781.00	360.36	10.86
38841.00	360.34	10.84
38901.00	360.39	10.89
38961.00	360.49	10.99
39021.00	360.37	10.87
39081.00	360.44	10.94
39141.00	360.46	10.96
39201.00	360.40	10.90

CE-DT-5 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
39261.00	360.39	10.89
39321.00	360.34	10.84
39381.00	360.38	10.88
39681.00	360.44	10.94
39741.00	360.40	10.90
39801.00	360.39	10.89
39961.00	360.40	10.90
39921.00	360.40	10.90
39981.00	360.38	10.88
40041.00	360.33	10.83
40101.00	360.40	10.90
40161.00	360.29	10.79
40221.00	360.38	10.88
40281.00	360.33	10.83
40341.00	360.34	10.84
40401.00	360.37	10.87
40461.00	360.39	10.89
40521.00	360.47	10.97
40581.00	360.50	11.00
40641.00	360.47	10.97
40701.00	360.46	10.96
40761.00	360.47	10.97
40821.00	360.43	10.93
40881.00	360 44	10.94
40941.00	360.32	10.82
41001.00	360.46	10.96
41061.00	360.47	10 97
41121.00	360.41	10.91
41181.00	360.45	10.95
41241.00	360.40	10.90
41301.00	360.40	10.90
41361.00	360.34	10.84
41421.00	360 30	10.80
41481.00	360 31	10.81
41541.00	360.30	10.80
41601.00	360.26	10.76
41661.00	360.27	10.77
41721.00	360.25	10.75
41841.00	360 30	10.80
41901.00	360.26	10.76
[illegible]	360.46	10 96
42021.00	360.38	10.88
42081.00	360 41	10.91
42141.00	360 39	10.89
42201 00	360 44	10.94
42261 00	360 41	10.91
42321 00	360 39	10.89
42381 00	360 40	10.90
4244[illegible] 00	360.44	10.94

APPENDIX B1.3

WATER LEVEL MEASUREMENTS
OBSERVATION WELLS

WATER LEVEL MEASUREMENTS FOR OBSERVATION WELL CE-DT-4
LOCATION: 13S/63E-23D ELEVATION: 2172.58 FEET AMSL
INITIAL STATIC WATER LEVEL 352.3 FEET BELOW LAND SURFACE

DATE OF MEASUREMENT	TIME	WATER LEVEL BELOW LAND SURFACE-FEET	REMARKS
6-28-81	1106	352.3	
6-30-81	1300	352.4	
7-4-81	1230	352.3	
7-12-81	1042	352.3	PUMP ON
	1800	352.5	
7-13-81	0700	352.5	
	1700	352.6	PUMP OFF AT 1710 HRS.
7-14-81	0845	352.3	TIME APPROXIMATE
7-15-81	1755	352.3	" "
7-16-81	1050	352.3	" "
7-17-81	1312	352.3	PUMP ON
	1500	352.4	
7-18-81	0300	352.4	PUMP OFF AT 0526 HRS.
	1200	352.3	
	2052	352.3	PUMP ON
7-19-81	0500	352.3	
	1300	352.6	
7-20-81	0400	352.5	
	1500	352.7	
7-21-81	0400	352.6	
	1500	352.7	
7-22-81	0500	352.7	PUMP OFF AT 1100 HRS.
7-29-81	----	-----	PUMP ON AT 1934 HRS.
7-30-81	2223	352.3	PUMP OFF AT 1714 HRS.
	----	-----	PUMP ON AT 2221 HRS.
7-31-81	0724	352.3	
	2000	352.4	
8-1-81	0500	352.3	
	1500	352.5	
8-2-81	0500	352.4	
	1900	352.4	
8-3-81	0600	352.4	
	1500	352.4	
8-4-81	0900	352.4	
	1600	352.5	
8-5-81	0600	352.5	
8-6-81	0700	352.4	
8-6-81	1700	352.6	
8-7-81	0555	352.6	
	1600	352.6	
8-8-81	0930	352.8	

OBSERVATION WELL CE-DT-4 (CONT.)

DATE OF MEASUREMENT	TIME	WATER LEVEL BELOW LAND SURFACE-FEET	REMARKS
8-9-81	0700	352.3	
	2250	352.3	
8-10-81	0700	352.4	
	1500	352.3	
8-11-81	0900	352.4	
	2000	352.2	
8-12-81	0830	352.2	
	1550	352.3	
8-14-81	0600	352.4	
	2010	352.4	
8-15-81	0645	352.4	
	1645	352.1	
8-16-81	0615	352.4	
	1920	352.2	
8-17-81	0730	352.2	
	1930	352.2	
8-18-81	0700	352.3	
	1950	352.3	
8-19-81	0705	352.3	
	2035	352.3	
8-20-81	0750	352.3	
	2015	352.3	
8-21-81	0750	352.3	
	2000	352.3	
8-22-81	0730	352.4	
	1925	352.4	
8-23-81	0810	352.5	
	2005	352.5	
8-24-81	0810	352.5	
	1600	352.5	
8-25-81	0750	352.4	PUMP OFF AT 1057 HRS.
8-26-81	0845	352.3	PUMP ON AT 1029 HRS.
	2110	352.3	
8-27-81	0840	352.3	PUMP OFF AT 1420 HRS.

C E - D T - 4 AQUIFER TEST #8 DATA

(SINCO DATA CONVERSION)

DISTANCE FROM TEST WELL: 330 FEET
START-TIME/DATE: 1839/08-28-81
STOP-TIME/DATE: 2139/09-28-81
DURATION OF TEST: 30 DAYS

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
0.00	352.30	0.00
0.07	352.30	0.00
0.13	352.30	0.00
0.20	352.31	0.01
0.27	352.31	0.01
0.33	352.31	0.01
0.40	352.30	-0.00
0.47	352.31	0.01
0.53	352.30	-0.00
0.60	352.30	-0.00
0.67	352.31	0.01
0.73	352.31	0.01
0.80	352.31	0.01
0.87	352.31	0.01
0.93	352.31	0.01
1.00	352.31	0.01
1.07	352.32	0.02
1.13	352.31	0.01
1.20	352.30	-0.00
1.27	352.32	0.02
1.33	352.31	0.01
1.40	352.32	0.02
1.47	352.32	0.02
1.53	352.32	0.02
1.60	352.31	0.01
1.67	352.32	0.02
1.73	352.33	0.03
1.80	352.31	0.01
1.87	352.32	0.02
1.93	352.31	0.01
2.00	352.31	0.01
2.07	352.32	0.02
2.13	352.31	0.01
2.20	352.32	0.02
2.27	352.31	0.01
2.33	352.31	0.01
2.40	352.31	0.01
2.47	352.31	0.01

CE-DT-4 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
2.53	352.32	0.02
2.60	352.33	0.03
2.67	352.33	0.03
2.73	352.32	0.02
2.80	352.32	0.02
2.87	352.32	0.02
2.93	352.31	0.01
3.00	352.32	0.02
4.00	352.32	0.02
5.00	352.32	0.02
6.00	352.32	0.02
7.00	352.31	0.01
8.00	352.31	0.01
9.00	352.30	-0.00
10.00	352.32	0.02
11.00	352.32	0.02
12.00	352.31	0.01
13.00	352.30	-0.00
14.00	352.31	0.01
15.00	352.31	0.01
16.00	352.31	0.01
17.00	352.31	0.01
18.00	352.32	0.02
19.00	352.31	0.01
20.00	352.31	0.01
21.00	352.32	0.02
22.00	352.32	0.02
23.00	352.32	0.02
24.00	352.32	0.02
25.00	352.32	0.02
26.00	352.31	0.01
27.00	352.32	0.02
28.00	352.32	0.02
29.00	352.32	0.02
30.00	352.32	0.02
35.00	352.32	0.02
40.00	352.33	0.03
45.00	352.33	0.03
50.00	352.33	0.03
55.00	352.33	0.03
60.00	352.33	0.03
65.00	352.33	0.03
70.00	352.33	0.03
75.00	352.35	0.05
80.00	352.35	0.05
85.00	352.35	0.05
90.00	352.35	0.05
95.00	352.36	0.06
100.00	352.36	0.06

CE-DT-4 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
105.00	352.35	0.05
110.00	352.35	0.05
115.00	352.36	0.06
120.00	352.37	0.07
125.00	352.37	0.07
130.00	352.37	0.07
135.00	352 37	0.07
140.00	352.37	0.07
145.00	352.36	0.06
150.00	352.37	0.07
155.00	352.36	0.06
186.00	352.38	0.08
196.00	352.39	0.09
211.00	352.39	0.09
226.00	352.39	0.09
241.00	352.38	0.08
256.00	352.40	0.10
271.00	352.40	0.10
286.00	352.40	0.10
301.00	352.40	0.10
316.00	352.40	0.10
381.00	352.40	0.10
441.00	352.42	0.12
501.00	352.42	0.12
561.00	352.42	0.12
621.00	352.42	0.12
681.00	352.43	0.13
741.00	352.45	0.15
801.00	352.45	0.15
861.00	352.46	0.16
921.00	352.48	0.18
981.00	352.49	0.19
1041.00	352.47	0.17
1101.00	352.46	0.16
1161.00	352.44	0.14
1221.00	352.42	0.12
1281.00	352.38	0.08
1341.00	352.36	0.06
1401.00	352.36	0.06
1461.00	352.37	0.07
1521.00	352.39	0.09
1581.00	352.40	0.10
1641.00	352.42	0.12
1701.00	352.43	0.13
1761.00	352.44	0.14
1821.00	352.43	0.13
1881.00	352.44	0.14
1941.00	352.44	0.14
2001.00	352.43	0.13

CE-DT-4 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
2061.00	352.42	0.12
2121.00	352.40	0.10
2181.00	352.40	0.10
2241.00	352.42	0.12
2301.00	352.42	0.12
2361.00	352.44	0.14
2421.00	352.43	0.13
2481.00	352.44	0.14
2541.00	352.43	0.13
2601.00	352.43	0.13
2661.00	352.41	0.11
2721.00	352.39	0.09
2781.00	352.38	0.08
2841.00	352.38	0.08
2901.00	352.37	0.07
2961.00	352.38	0.08
3021.00	352.42	0.12
3081.00	352.42	0.12
3141.00	352.43	0.13
3201.00	352.44	0.14
3261.00	352.46	0.16
3321.00	352.45	0.15
3381.00	352.46	0.16
3441.00	352.46	0.16
3501.00	352.44	0.14
3561.00	352.45	0.15
3621.00	352.46	0.16
3681.00	352.49	0.19
3741.00	352.47	0.17
3801.00	352.50	0.20
3861.00	352.50	0.20
3921.00	352.50	0.20
3981.00	352.50	0.20
4041.00	352.50	0.20
4101.00	352.49	0.19
4161.00	352.47	0.17
4221.00	352.45	0.15
4281.00	352.45	0.15
4341.00	352.45	0.15
4401.00	352.45	0.15
4461.00	352.46	0.16
4521.00	352.49	0.19
4581.00	352.49	0.19
4641.00	352.50	0.20
4701.00	352.52	0.22
4761.00	352.51	0.21
4821.00	352.50	0.20
4881.00	352.52	0.22
4941.00	352.52	0.22

CE-DT-4 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
5001.00	352.50	0.20
5301.00	352.52	0.22
5361.00	352.52	0.22
5421.00	352.51	0.21
5481.00	352.50	0.20
5541.00	352.46	0.16
5601.00	352.46	0.16
5661.00	352.45	0.15
5721.00	352.43	0.13
5781.00	352.43	0.13
5841.00	352.44	0.14
5901.00	352.44	0.14
5961.00	352.45	0.15
6021.00	352.46	0.16
6081.00	352.45	0.15
6141.00	352.47	0.17
6201.00	352.48	0.18
6261.00	352.50	0.20
6321.00	352 47	0.17
6381.00	352.49	0.19
6441.00	352.47	0.17
6501.00	352.49	0.19
6561.00	352.49	0.19
6621.00	352.49	0.19
6681.00	352.49	0.19
6741.00	352.49	0.19
6801 00	352.49	0.19
6861.00	352.49	0.19
6921.00	352.49	0.19
6981.00	352.47	0.17
7041.00	352.45	0.15
7101.00	352.45	0.15
7161.00	352.45	0.15
7221.00	352.48	0.18
7281.00	352.46	0.16
7401.00	352.47	0.17
7461.00	352.49	0.19
7521.00	352.50	0.20
7581.00	352.51	0.21
7641.00	352.51	0.21
7701.00	352.51	0.21
7761.00	352.51	0.21
7821.00	352.50	0.20
7881.00	352.50	0.20
7941.00	352.52	0.22
8001.00	352 53	0.23
8061.00	352.52	0.22
8121.00	352.52	0.22
8181.00	352.53	0.23

CE-DT-4 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
8241.00	352.52	0.22
8301.00	352.50	0.20
8361.00	352.50	0.20
8421.00	352.49	0.19
8481.00	352.47	0.17
8541.00	352.47	0.17
8601.00	352.46	0.16
8661.00	352.45	0.15
8721.00	352.46	0.16
8781.00	352.47	0.17
8841.00	352.49	0.19
8901.00	352.50	0.20
8961.00	352.50	0.20
9021.00	352.51	0.21
9081.00	352.54	0.24
9141.00	352.53	0.23
9201.00	352.52	0.22
9261.00	352.52	0.22
9321.00	352.51	0.21
9381.00	352.52	0.22
9441.00	352.52	0.22
9501.00	352.51	0.21
9561.00	352.51	0.21
9621.00	352.50	0.20
9681.00	352.49	0.19
9741.00	352.47	0.17
9801.00	352.48	0.18
9861.00	352.48	0.18
9921.00	352.48	0.18
9981.00	352.51	0.21
10041.00	352.54	0.24
10101.00	352.54	0.24
10161.00	352.53	0.23
10221.00	352.51	0.21
10281.00	352.50	0.20
10341.00	352.51	0.21
10401.00	352.51	0.21
10461.00	352.51	0.21
10521.00	352.51	0.21
10581.00	352.52	0.22
10641.00	352.52	0.22
10701.00	352.52	0.22
10761.00	352.53	0.23
10821.00	352.52	0.22
10881.00	352.53	0.23
10941.00	352.53	0.23
11001.00	352.54	0.24
11061.00	352.52	0.22
11121.00	352.50	0.20

CE-DT-4 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
11181.00	352.49	0.19
11241.00	352.47	0.17
11301.00	352.47	0.17
11361.00	352.45	0.15
11421.00	352.45	0.15
11541.00	352.46	0.16
11601.00	352.47	0.17
11661.00	352.49	0.19
11721.00	352.54	0.24
11781.00	352.54	0.24
11841.00	352.60	0.30
11901.00	352.58	0.28
11961.00	352.57	0.27
12021.00	352.58	0.28
12081.00	352.58	0.28
12141.00	352.59	0.29
12201.00	352.64	0.34
12261.00	352.61	0.31
12321.00	352.61	0.31
12381.00	352.63	0.33
12441.00	352.63	0.33
12501.00	352.60	0.30
12561.00	352.59	0.29
12621.00	352.58	0.28
12681.00	352.58	0.28
12741.00	352.57	0.27
12801.00	352.53	0.23
12861.00	352.54	0.24
12921.00	352.57	0.27
12981.00	352.62	0.32
13401.00	352.64	0.34
13101.00	352.64	0.34
13161.00	352.63	0.33
13221.00	352.62	0.32
13281.00	352.63	0.33
13341.00	352.62	0.32
13401.00	352.62	0.32
13461.00	352.64	0.34
13821.00	352.69	0.39
13881.00	352.70	0.40
13941.00	352.67	0.37
14001.00	352.66	0.36
14061.00	352.65	0.35
14121.00	352.63	0.33
14181.00	352.60	0.30
14241.00	352.58	0.28
14301.00	352.58	0.28
14361.00	352.57	0.27
14421.00	352.58	0.28

CE-DT-4 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
14481.00	352.59	0.29
14541.00	352.60	0.30
14601.00	352.60	0.30
14661.00	352.62	0.32
14781.00	352.60	0.30
14841.00	352.60	0.30
14901.00	352.60	0.30
14961.00	352.60	0.30
15021.00	352.62	0.32
15081.00	352.63	0.33
15141.00	352.64	0.34
15201.00	352.65	0.35
15261.00	352.65	0.35
15321.00	352.65	0.35
15381.00	352.64	0.34
15441.00	352.64	0.34
15501.00	352.62	0.32
15561.00	352.59	0.29
15621.00	352.58	0.28
15681.00	352.57	0.27
15741.00	352.62	0.32
15801.00	352.56	0.26
15861.00	352.56	0.26
15921.00	352.58	0.28
15981.00	352.60	0.30
16041.00	352.60	0.30
16101.00	352.58	0.28
16161.00	352.60	0.30
16221.00	352.57	0.27
16281.00	352.57	0.27
16341.00	352.57	0.27
16401.00	352.57	0.27
16461.00	352.57	0.27
16521.00	352.58	0.28
16581.00	352.60	0.30
16641.00	352.64	0.34
16701.00	352.62	0.32
16761.00	352.62	0.32
16821.00	352.62	0.32
16881.00	352.60	0.30
16941.00	352.57	0.27
17061.00	352.53	0.23
17121.00	352.51	0.21
17181.00	352.50	0.20
17241.00	352.53	0.23
17301.00	352.52	0.22
17361.00	352.53	0.23
17421.00	352.56	0.26
17481.00	352.54	0.24

CE-DT-4 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
17541.00	352.54	0.24
17601.00	352.57	0.27
17661.00	352.53	0.23
17721.00	352.53	0.23
17781.00	352.53	0.23
17841.00	352.56	0.26
17901.00	352.57	0.27
17961.00	352.58	0.28
18021.00	352.59	0.29
18081.00	352.60	0.30
18141.00	352.60	0.30
18201.00	352.60	0.30
18261.00	352.63	0.33
18321.00	352.63	0.33
18381.00	352.61	0.31
18441.00	352.61	0.31
12501.00	352.59	0.29
18561.00	352.58	0.28
18621.00	352.57	0.27
18681.00	352.60	0.30
18741.00	352.59	0.29
18801.00	352.63	0.33
18861.00	352.64	0.34
18921.00	352.64	0.34
18981.00	352.65	0.35
19041.00	352.64	0.34
19101.00	352.63	0.33
19161.00	352.63	0.33
19221.00	352.61	0.31
19281.00	352.59	0.29
19341.00	352.58	0.28
19401.00	352.59	0.29
19461.00	352.62	0.32
19521.00	352.60	0.30
19581.00	352.65	0.35
19599.00	352.63	0.33
19830.00	352.58	0.28
19831.00	352.61	0.31
19832.00	352.64	0.34
19833.00	352.66	0.36
19834.00	352.66	0.36
19835.00	352.68	0.38
19881.00	352.63	0.33
19941.00	352.63	0.33
20001.00	352.59	0.29
20061.00	352.60	0.30
20121.00	352.59	0.29
20181.00	352.58	0.28
20241.00	352.56	0.26

CE-OT-4 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
20301.00	352.58	0.28
20361.00	352.59	0.29
20421.00	352.61	0.31
20481.00	352.63	0.33
20541.00	352.63	0.33
20601.00	352.61	0.31
20661.00	352.59	0.29
20721.00	352.59	0.29
20781.00	352.56	0.26
20841.00	352.55	0.25
20901.00	352.56	0.26
20961.00	352.58	0.28
21021.00	352.58	0.28
21081.00	352.59	0.29
21141.00	352.62	0.32
21201.00	352.63	0.33
21261.00	352.65	0.35
21321.00	352.64	0.34
21381.00	352.61	0.31
21441.00	352.60	0.30
21501.00	352.59	0.29
21561.00	352.58	0.28
21621.00	352.56	0.26
21681.00	352.58	0.28
21741.00	352.59	0.29
21801.00	352.60	0.30
21861.00	352.60	0.30
21921.00	352.61	0.31
21981.00	352.60	0.30
22041.00	352.58	0.28
22101.00	352.58	0.28
22161.00	352.57	0.27
22221.00	352.55	0.25
22281.00	352.53	0.23
22341.00	352.53	0.23
22401.00	352.53	0.23
22461.00	352.55	0.25
22521.00	352.57	0.27
22581.00	352.59	0.29
22641.00	352.61	0.31
22701.00	352.64	0.34
22761.00	352.63	0.33
22821.00	352.64	0.34
22881.00	352.60	0.30
22941.00	352.59	0.29
23001.00	352.56	0.26
23061.00	352.53	0.23
23121.00	352.53	0.23
23181.00	352.54	0.24

CE-GT-4 AQUIFER TEST #8 DATA (CONT.)

TIME (MINUTES)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
23241.00	352.57	0.27
23301.00	352.58	0.28
23361.00	352.60	0.30
23421.00	352.61	0.31
23481.00	352.60	0.30
23541.00	352.59	0.29
23601.00	352.56	0.26
23661.00	352.54	0.24
23721.00	352.53	0.23
23781.00	352.51	0.21
23841.00	352.52	0.22
23901.00	352.52	0.22
23961.00	352.56	0.26
24021.00	352.57	0.27
24081.00	352.61	0.31
24141.00	352.63	0.33
24201.00	352.64	0.34
24261.00	352.64	0.34
24321.00	352.64	0.34
24381.00	352.64	0.34
24441.00	352.63	0.33
24501.00	352.57	0.27
24561.00	352.56	0.26
24621.00	352.54	0.24
24681.00	352.59	0.29
24741.00	352.59	0.29
24801.00	352.59	0.29
24861.00	352.61	0.31
24921.00	352.64	0.34
24981.00	352.60	0.30
25041.00	352.59	0.29
25101.00	352.59	0.29
25161.00	352.55	0.25
25221.00	352.55	0.25
25281.00	352.53	0.23
25341.00	352.55	0.25
25401.00	352.55	0.25
25461.00	352.57	0.27
25521.00	352.60	0.30
25581.00	352.61	0.31
25641.00	352.65	0.35
25701.00	352.64	0.34
25761.00	352.64	0.34
26021.00	352.63	0.33
26081.00	352.60	0.30
26141.00	352.58	0.28
26201.00	352.57	0.27
26261.00	352.59	0.29
26321.00	352.59	0.29

CE-DT-4 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
26381.00	352.58	0.28
26441.00	352.61	0.31
26501.00	352.65	0.35
26561.00	352.63	0.33
26621.00	352.61	0.31
26681.00	352.64	0.34
26741.00	352.61	0.31
26801.00	352.57	0.27
26861.00	352.56	0.26
26921.00	352.59	0.29
26981.00	352.57	0.27
27041.00	352.59	0.29
27101.00	352.59	0.29
27161.00	352.62	0.32
27221.00	352.65	0.35
27281.00	352.63	0.33
27341.00	352.65	0.35
27401.00	352.64	0.34
27461.00	352.64	0.34
27521.00	352.60	0.30
27581.00	352.58	0.28
27641.00	352.59	0.29
27701.00	352.59	0.29
27761.00	352.59	0.29
27821.00	352.60	0.30
27881.00	352.62	0.32
27941.00	352.60	0.33
28001.00	352.65	0.35
28061.00	352.65	0.35
28121.00	352.63	0.33
28181.00	352.64	0.34
28241.00	352.64	0.34
28301.00	352.62	0.32
28361.00	352.58	0.28
28421.00	352.58	0.28
28481.00	352.56	0.26
28541.00	352.58	0.28
28601.00	352.59	0.29
28661.00	352.60	0.30
28721.00	352.63	0.33
28781.00	352.65	0.35
28841.00	352.63	0.33
28901.00	352.63	0.33
28961.00	352.61	0.31
29021.00	352.59	0.29
29081.00	352.58	0.28
29141.00	352.59	0.29
29201.00	352.59	0.29
29261.00	352.58	0.28

CE-DT-4 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
29321.00	352.59	0.29
29381.00	352.62	0.32
29441.00	352.62	0.32
29501.00	352.62	0.32
29561.00	352.60	0.30
29621.00	352.63	0.33
29681.00	352.62	0.32
29741.00	352.59	0.29
29801.00	352.60	0.30
29861.00	352.60	0.30
29921.00	352.56	0.26
29981.00	352.57	0.27
30041.00	352.59	0.29
30101.00	352.58	0.28
30161.00	352.58	0.28
30221.00	352.60	0.30
30281.00	352.60	0.30
30341.00	352.58	0.28
30401.00	352.60	0.30
30461.00	352.57	0.27
30521.00	352.57	0.27
30581.00	352.56	0.26
30641.00	352.58	0.28
30701.00	352.56	0.26
30761.00	352.57	0.27
30821.00	352.57	0.27
30881.00	352.57	0.27
30941.00	352.58	0.28
31001.00	352.58	0.28
31061.00	352.59	0.29
31121.00	352.59	0.29
31181.00	352.60	0.30
31241.00	352.58	0.28
31301.00	352.56	0.26
31361.00	352.59	0.29
31421.00	352.57	0.27
31481.00	352.56	0.26
31541.00	352.56	0.26
31601.00	352.54	0.24
31661.00	352.54	0.24
31721.00	352.55	0.25
31781.00	352.55	0.25
31841.00	352.56	0.26
31901.00	352.53	0.23
31961.00	352.54	0.24
32021.00	352.52	0.22
32081.00	352.53	0.23
32141.00	------	----
32201.00	352.53	0.23

CE-DT-4 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
32281.00	------	----
32321.00	------	----
32381.00	------	----
32441.00	------	----
32501.00	------	----
32561.00	352.58	0.28
32621.00	352.59	0.29
32681.00	352.56	0.26
32741.00	352.54	0.24
32801.00	352.54	0.24
32861.00	352.56	0.26
32921.00	352.54	0.24
32981.00	352.53	0.23
33041.00	352.52	0.22
33101.00	352.53	0.23
33161.00	352.53	0.23
33221.00	352.53	0.23
33281.00	352.53	0.23
33341.00	352.54	0.24
33401.00	352.54	0.24
33461.00	352.55	0.25
33521.00	352.54	0.24
33581.00	352.56	0.26
33641.00	352.53	0.23
33701.00	352.53	0.23
33761.00	352.53	0.23
33821.00	352.54	0.24
33881.00	352.56	0.28
33941.00	352.57	0.27
34001.00	352.58	0.28
34061.00	352.58	0.28
34121.00	352.56	0.26
34181.00	352.57	0.27
34241.00	352.56	0.26
34301.00	352.56	0.26
34361.00	352.56	0.26
34421.00	352.52	0.22
34481.00	352.52	0.22
34541.00	352.55	0.25
34601.00	352.54	0.24
34661.00	352.52	0.22
34721.00	352.54	0.24
34781.00	352.57	0.27
34841.00	352.55	0.25
34901.00	352.57	0.27
34961.00	352.54	0.24
35021.00	352.54	0.24
35081.00	352.54	0.24
35141.00	352.53	0.23

CE-OT-4 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
35201.00	352.53	0.23
35261.00	352.52	0.22
35321.00	352.53	0.23
35381.00	352.54	0.24
35441.00	352.58	0.28
35501.00	352.58	0.28
35561.00	352.58	0.28
35621.00	352.58	0.28
35681.00	352.57	0.27
35741.00	352.54	0.24
35801.00	352.54	0.24
35861.00	352.54	0.24
35921.00	352.54	0.24
35981.00	352.52	0.22
36041.00	352.51	0.21
36101.00	352.52	0.22
36161.00	352.55	0.25
36221.00	352.57	0.27
36281.00	352.57	0.27
36341.00	352.58	0.28
36401.00	352.57	0.27
36461.00	352.54	0.24
36521.00	352.53	0.23
36581.00	352.49	0.19
36641.00	352.50	0.20
36701.00	352.50	0.20
36761.00	352.49	0.19
36821.00	352.51	0.21
36881.00	352.52	0.22
36941.00	352.53	0.23
37001.00	352.57	0.27
37061.00	352.57	0.27
37121.00	352.60	0.30
37181.00	352.57	0.27
37241.00	352.56	0.26
37301.00	352.52	0.22
37361.00	352.53	0.23
37421.00	352.51	0.21
37481.00	352.50	0.20
37541.00	352.51	0.21
37601.00	352.52	0.22
37661.00	352.53	0.23
37721.00	352.54	0.24
37781.00	352.56	0.26
37841.00	352.54	0.24
37901.00	352.54	0.24
37961.00	352.52	0.22
38021.00	352.52	0.22
38081.00	352.50	0.20

CE-DT-4 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	
38141.00	352.51	0.21	
38201.00	352.50	0.20	
38261.00	352.52	0.22	
38321.00	352.54	0.24	
38381.00	352.56	0.26	
38441.00	352.58	0.28	
38501.00	352.59	0.29	
38561.00	352.58	0.28	
38621.00	352.58	0.28	
38681.00	352.56	0.26	
38741.00	352.52	0.22	
38801.00	352.51	0.21	
38861.00	352.49	0.19	
38921.00	352.51	0.21	
38981.00	352.47	0.17	
39041.00	352.47	0.17	
39101.00	352.50	0.20	
39161.00	352.50	0.20	
39221.00	352.52	0.22	
39281.00	352.52	0.22	
39341.00	352.51	0.21	
39401.00	352.50	0.20	
39461.00	352.50	0.20	
39521.00	352.46	0.16	
39581.00	------	----	
39641.00	------	----	SINGLE BATTERY
39701.00	------	----	UNCHARGED
39761.00	------	----	
39821.00	352.54	0.24	
39881.00	352.56	0.26	
39941.00	352.57	0.27	
40001.00	352.56	0.26	
40061.00	352.60	0.30	
40121.00	352.58	0.28	
40181.00	352.58	0.28	
40241.00	352.55	0.25	
40301.00	352.55	0.25	
40361.00	352.53	0.23	
40421.00	352.51	0.21	
40481.00	352.52	0.22	
40541.00	352.52	0.22	
40601.00	352.54	0.24	
40661.00	352.56	0.26	
40721.00	352.56	0.26	
40781.00	352.53	0.23	
40841.00	352.52	0.22	
40901.00	352.53	0.23	
40961.00	352.51	0.21	
41021.00	352.52	0.22	

CE-DT-4 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
41081.00	352.50	0.20
41141.00	352.52	0.22
41201.00	352.53	0.23
41261.00	352.55	0.25
41321.00	352.58	0.28
41381.00	352.56	0.26
41441.00	352.58	0.28
41501.00	352.57	0.27
41561.00	352.57	0.27
41621.00	352.56	0.26
41681.00	352.54	0.24
41741.00	352.51	0.21
41801.00	352.50	0.20
41861.00	352.50	0.20
41921.00	------	----
41981.00	352.50	0.20
42041.00	352.53	0.23
42101.00	352.54	0.24
42161.00	352.56	0.26
42221.00	352.54	0.24
42281.00	352.54	0.24
42341.00	352.52	0.22
42401.00	352.50	0.20
42461.00	352.48	0.18
42521.00	352.49	0.19
42581.00	352.50	0.20
42641.00	352.50	0.20
42701.00	352.51	0.21

CE-DT-4 AQUIFER TEST #8 DATA (CONT.)

TIME (MIN.)	WATER LEVEL (FEET)	DRAWDOWN (FEET)
42761.00	352.52	0.22
42821.00	352.55	0.25
42881.00	352.53	0.23
42941.00	352.55	0.25
43001.00	352.53	0.23
43061.00	352.58	0.28
43121.00	352.56	0.26
43181.00	352.55	0.25
43241.00	352.52	0.22
43301.00	352.54	0.24
43361.00	352.51	0.21
43421.00	352.53	0.23
43481.00	352.52	0.22
43541.00	352.52	0.22

WATER LEVEL MEASUREMENTS FOR OBSERVATION WELL CE-DT-6
LOCATION: 14S/64E-35D ELEVATION: 2274.57 FEET AMSL
INITIAL STATIC WATER LEVEL 457.0 FEET BELOW LAND SURFACE

DATE OF MEASUREMENT	TIME	WATER LEVEL BELOW LAND SURFACE-FEET	REMARKS
6-6-81	1925	457.0	
7-11-81	1000	457.4	TIME APPROXIMATE
7-15-81	1855	457.4	" "
7-16-81	1110	457.4	" "
7-17-81	1010	457.4	" "
7-25-81	1030	457.4	" "
7-26-81	2020	457.4	" "
7-27-81	1720	457.4	" "
7-28-81	1040	457.4	" "
7-29-81	1220	457.4	" "
7-30-81	1820	457.4	" "
7-31-81	1820	457.4	" "
8-1-81	0850	457.7	
8-1-81	1910	457.6	
8-2-81	0815	457.7	
8-3-81	0820	457.6	
	1905	457.6	
8-4-81	0840	457.7	
	1840	457.6	
8-5-81	0835	457.8	
	1915	457.6	
8-6-81	0815	457.7	
	1905	457.6	
8-7-81	0837	457.7	
	1500	457.6	
8-8-81	0827	457.6	
	2030	457.7	
8-9-81	0845	457.9	
8-10-81	0900	457.9	
	1534	457.8	
8-11-81	1004	457.8	
	2220	457.8	
8-12-81	1117	457.7	
8-13-81	0745	457.8	
8-14-81	0800	457.7	
	2200	457.6	
8-15-81	0930	457.8	
	1600	458.0	
8-16-81	1030	457.9	
	1800	457.8	
8-17-81	1010	457.8	
	1850	457.8	
8-18-81	0910	457.9	
	1805	457.8	
8-19-81	1030	457.9	
	1810	457.8	
8-20-81	1040	457.8	
	1840	457.8	
8-21-81	0910	457.7	
	1830	457.8	

OBSERVATION WELL CE-DT-6 (CONT.)

DATE OF MEASUREMENT	TIME	WATER LEVEL BELOW LAND SURFACE-FEET	REMARKS
8-22-81	1120	457.9	
	1910	457.7	
8-23-81	1205	457.7	
	1925	457.7	
8-24-81	0930	457.8	
	1615	457.7	
8-25-81	0925	457.7	
8-26-81	1825	457.6	
8-27-81	1115	457.8	
	1800	457.6	
8-28-81	0805	457.8	
	2005	457.6	
	1855	457.5	
8-30-81	1115	457.8	
8-31-81	0815	457.8	
9-1-81	1945	457.6	
9-2-81	0855	457.7	
	2015	457.6	
9-3-81	1115	457.8	
	1530	457.7	
9-4-81	1120	457.7	
	1905	457.8	
9-5-81	1310	457.8	
	1830	457.8	
9-6-81	1030	458.0	
9-7-81	1305	458.3	
	1720	457.8	
9-8-81	1150	458.0	
	1820	458.0	
9-9-81	1010	457.9	
	1730	457.8	
9-10-81	1040	457.8	
	1710	457.8	
9-11-81	1315	457.9	
9-11-81	1820	458.0	
9-12-81	1025	458.0	
9-13-81	1015	457.9	
	1925	458.0	
9-14-81	1025	457.9	
	1950	457.8	
9-15-81	0800	457.8	
	1950	457.8	
9-16-81	0750	457.9	
	1950	457.9	
9-17-81	0803	457.9	
	1950	457.9	
9-18-81	0750	457.9	
9-19-81	0820	457.9	
9-20-81	0850	457.8	
	1910	457.7	

OBSERVATION WELL CE-DT-6 (CONT.)

DATE OF MEASUREMENT	TIME	WATER LEVEL BELOW LAND SURFACE-FEET	REMARKS
9-21-81	0740	457.9	
9-22-81	1020	457.8	
	1905	457.8	
9-23-81	1055	457.8	
	1745	457.8	
9-24-81	0910	457.8	
	1610	457.8	
9-25-81	0905	457.8	
	1845	457.8	
9-26-81	1005	457.8	
	1825	457.8	
9-27-81	1230	457.9	
	1825	457.8	
9-28-81	0920	457.8	
9-29-81	1025	457.9	

WATER LEVEL MEASUREMENTS FOR OBSERVATION WELL "OLD HIGHWAY WELL"
LOCATION: 13S/63E-11B ELEV 2223.63 FEET AMSL
INITIAL STATIC WATER LEVEL 164.6 FEET BELOW LAND SURFACE

DATE OF MEASUREMENT	TIME	WATER LEVEL BELOW LAND SURFACE-FEET	REMARKS
7-19-81	0750	164.7	TIME APPROXIMATE
7-20-81	1950	164.6	" "
7-21-81	0830	164.6	" "
7-23-81	1330	164.6	" "
7-24-81	1240	164.6	" "
7-25-81	0900	164.7	" "
7-26-81	1840	164.6	" "
7-27-81	1600	164.6	" "
7-28-81	0905	164.6	" "
7-29-81	1055	164.6	" "
7-30-81	1700	164.7	" "
7-31-81	1630	164.6	" "
8-1-81	1010	164.9	
8-2-81	0950	164.9	
8-3-81	0940	164.8	
8-4-81	1040	164.8	
8-5-81	1005	164.8	
8-6-81	0955	164.8	
8-7-81	0955	164.9	
8-8-81	1045	164.7	
8-9-81	1005	164.7	
8-10-81	0700	164.8	
8-11-81	----	-----	ROAD TO WELL INACCESSABLE
8-12-81	----	-----	" " " "
8-14-81	0940	165.0	
8-15-81	1220	165.4	
8-16-81	0815	166.5	
8-17-81	0815	164.8	
8-18-81	0805	164.7	
8-19-81	1630	164.8	
8-20-81	0900	165.2	
8-21-81	0750	165.3	
8-22-81	0740	166.3	
8-23-81	0745	166.4	
8-24-81	0715	166.4	
8-25-81	0900	166.3	
8-26-81	0955	164.8	
8-27-81	0935	164.6	
8-28-81	1200	164.8	
8-29-81	1150	164.9	
8-30-81	1242	164.8	
8-31-81	1235	164.8	
9-1-81	1825	164.8	
9-2-81	1730	164.6	
9-3-81	1620	165.0	
9-4-81	1050	165.2	
9-5-81	----	-----	ROAD INACCESSABLE
9-6-81	----	-----	" "
9-7-81	----	-----	" "

OBSERVATION WELL "OLD HIGHWAY WELL" (CONT.)

DATE OF MEASUREMENT	TIME	WATER LEVEL BELOW LAND SURFACE-FEET	REMARKS
9-8-81	1225	164.8	
9-9-81	1140	164.9	
9-10-81	1115	165.1	
9-11-81	1645	165.0	
9-12-81	0805	165.0	
9-13-81	1600	164.7	
9-14-81	----	-----	SOUNDER SHORTED-OUT
9-15-81	1020	165.0	
9-16-81	1045	165.0	
9-17-81	1420	165.0	
9-18-81	1510	164.8	
9-19-81	1500	164.7	
9-20-81	1515	164.7	
9-22-81	0940	165.0	
9-23-81	1(	165.1	
9-24-81	0825	165.1	
9-25-81	0825	165.0	
9-26-81	0900	165.0	
9-27-81	0915	164.2	NEW SOUNDER
9-28-81	1010	164.5	" "
9-29-81	1600	164.4	" "

WATER LEVEL MEASUREMENTS FOR OBSERVATION WELL CE-VF-1,
VALLEY-FILL WELL
LOCATION: 12S/63E-29D ELEVATION: 2464.18 FEET AMSL
INITIAL STATIC WATER LEVEL 548.1 FEET BELOW LAND SURFACE

DATE OF MEASUREMENT	TIME	WATER LEVEL BELOW LAND SURFACE-FEET	REMARKS
7-14-81	0855	548.1	TIME APPROXIMATE
7-15-81	1820	548.1	" "
7-16-81	1030	548.2	" "
7-17-81	0930	548.1	" "
7-18-81	2030	548.1	" "
7-19-81	0830	548.1	" "
7-20-81	2030	548.1	" "
7-21-81	0920	548.2	" "
7-22-81	0840	548.1	" "
7-23-81	1020	548.2	" "
7-24-81	1320	548.2	" "
7-25-81	0940	548.1	" "
7-26-81	1920	548.1	" "
7-27-81	1640	548.1	" "
7-28-81	0955	548.1	" "
7-29-81	1140	548.1	" "
7-30-81	1740	548.3	" "
7-31-81	1745	548.2	
8-1-81	0940	548.4	
	1650	548.3	
8-2-81	0915	548.4	
	1935	548.3	
8-3-81	0915	548.4	
	2020	548.1	
8-4-81	0955	548.2	
	1925	548.1	
8-5-81	0925	548.4	
	2010	548.1	
8-6-81	0910	548.4	
	2000	548.1	
8-7-81	0910	548.3	
8-7-81	1920	548.2	
8-8-81	0815	548.3	
8-9-81	0830	548.4	
8-10-81	0630	548.3	
8-11-81	0730	548.3	
	1630	548.4	
8-12-81	1950	548.3	
8-13-81	0715	548.3	
8-14-81	0700	548.4	
8-15-81	0750	548.3	
8-17-81	1040	548.3	
8-18-81	1050	548.2	
8-19-81	1630	548.2	
8-20-81	0945	548.3	
8-21-81	0710	548.3	
8-22-81	0700	549.4	
8-23-81	0705	548.3	
8-24-81	0630	548.3	
8-25-81	0825	548.3	

OBSERVATION WELL CE-VF-1, VALLEY-FILL WELL (CONT.)

DATE OF MEASUREMENT	TIME	WATER LEVEL BELOW LAND SURFACE-FEET	REMARKS
8-26-81	1920	548.2	
8-27-81	1025	548.2	
8-28-81	1215	548.1	
8-29-81	1115	548.1	
8-30-81	1200	548.2	
8-31-81	1155	549.1	
9-1-81	1920	549.0	
9-2-81	1705	549.0	
9-3-81	1715	549.1	
9-4-81	0950	549.2	
9-5-81	0710	550.1	
9-6-81	0715	549.6	
9-7-81	0710	550.1	
9-9-81	0925	550.0	
9-10-81	0915	549.4	
9-11-81	1610	549.9	
9-12-81	0710	549.8	
9-13-81	1530	548.3	NEW SOUNDER
9-14-81	1130	548.3	
9-15-81	1325	548.5	
9-16-81	1810	548.5	
9-17-81	1515	548.5	
9-18-81	1605	548.5	
9-19-81	1555	548.5	
9-20-81	1620	548.3	
9-21-81	1310	548.4	
9-22-81	0910	548.5	
9-23-81	0935	548.5	
9-24-81	0725	548.6	
9-25-81	0720	548.6	
9-26-81	0815	548.8	
9-27-81	0830	548.5	NEW SOUNDER
9-28-81	0925	548.3	NEW SOUNDER
9-29-81	1620	547.7	

WATER LEVEL MEASUREMENTS FOR OBSERVATION WELL CE-VF-2, VALLEY-FILL/CARBONATE WELL

STATIC WATER LEVEL 611.7 FEET BELOW LAND SURFACE

DATE OF MEASUREMENT	TIME	WATER LEVEL BELOW LAND SURFACE-FEET	REMARKS
7-11-81	0800	611.7	TIME APPROXIMATE
7-12-81	1705	611.6	" "
7-19-81	0850	611.6	" "
7-24-81	1345	611.6	" "
7-25-81	1000	611.6	" "
7-26-81	1940	611.6	" "
7-27-81	1700	611.7	" "
7-28-81	1700	611.6	" "
7-29-81	1010	611.6	" "
7-30-81	1155	611.7	" "
7-31-81	1700	611.7	
8-1-81	0920	611.6	
8-1-81	1630	611.3	
8-2-81	0850	611.6	
8-2-81	1630	611.6	
8-3-81	0850	611.6	
8-3-81	2000	611.4	
8-4-81	0930	611.7	
	1910	611.4	
8-5-81	0910	611.6	
	1950	611.6	
8-6-81	0850	611.7	
	1945	611.6	
8-7-81	0905	611.6	
	1910	611.6	
8-8-81	0745	611.6	
8-9-81	0800	611.6	
8-10-81	0615	611.7	
8-11-81	0750	611.7	
	1600	611.7	
8-12-81	1930	611.6	
8-13-81	0645	611.6	
8-14-81	0640	611.6	
8-15-81	0730	611.6	
8-17-81	1045	610.1	
8-18-81	1055	610.2	
8-19-81	1700	610.2	
8-20-81	0950	610.2	
8-21-81	0715	610.2	
8-22-81	0710	610.2	
8-23-81	0710	610.0	
8-24-81	0635	608.8	
8-25-81	0840	609.1	
8-26-81	1900	609.7	
8-27-81	1020	609.8	
8-28-81	1230	609.2	
8-29-81	1100	609.3	
8-30-81	1145	609.9	
8-31-81	1145	609.9	

OBSERVATION WELL CE-VF-2, VALLEY-FILL/CARBONATE WELL (CONT.)

DATE OF MEASUREMENT	TIME	WATER LEVEL BELOW LAND SURFACE-FEET	REMARKS
9-1-81	1905	609.9	
9-2-81	1645	609.8	
9-3-81	1725	610.0	
9-4-81	1005	610.1	
9-5-81	0715	610.1	
9-6-81	0725	610.3	
9-7-81	0715	610.4	
9-8-81	1035	610.1	
9-9-81	0930	609.2	
9-10-81	0920	610.1	
9-11-81	1615	608.9	
9-12-81	0730	608.8	
9-13-81	1515	609.3	
9-15-81	1310	609.3	
9-16-81	1750	609.3	
9-17-81	1500	609.4	
9-18-81	1550	609.4	
9-19-81	1540	609.4	
9-20-81	1600	609.1	
9-21-81	1320	608.9	
9-22-81	0915	609.0	
9-23-81	0950	608.8	
9-24-81	0735	609.0	
9-25-81	0730	609.0	
9-26-81	0825	608.9	
9-27-81	0840	609.4	NEW SOUNDER
9-28-81	0955	609.3	
9-29-81	1625	609.0	

NEVADA POWER COMPANY MONITORING WELL - NORTH 7-4/7-31-80
LOCATION: 14S/63E-8bd ELEVATION: 1820 FEET ABOVE SEA LEVEL

CUMULATIVE TIME HOURS	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
00	7-04-80	0000	32.35
12	7-04-80	1200	32.25
24	7-04-80	2400	32.2
36	7-05-80	1200	32.2
48	7-05-80	2400	32.15
60	7-06-80	1200	32.15
72	7-06-80	2400	32.2
84	7-07-80	1200	32.2
96	7-07-80	2400	32.2
108	7-08-80	1200	32.25
120	7-08-80	2400	32.3
132	7-09-80	1200	32.3
144	7-09-80	2400	32.3
156	7-10-80	1200	32.3
168	7-10-80	2400	32.3
180	7-11-80	1200	32.3
192	7-11-80	2400	32.35
204	7-12-80	1200	32.35
216	7-12-80	2400	32.4
228	7-13-80	1200	32.4
240	7-13-80	2400	32.4
252	7-14-80	1200	32.4
264	7-14-80	2400	32.4
276	7-15-80	1200	32.4
288	7-15-80	2400	32.4
300	7-16-80	1200	32.45
312	7-16-80	2400	32.5
324	7-17-80	1200	32.55
336	7-17-80	2400	32.6
348	7-18-80	1200	32.6
360	7-18-80	2400	32.6
372	7-19-80	1200	32.55
384	7-19-80	2400	32.6
396	7-20-80	1200	32.65
408	7-20-80	2400	32.7
420	7-21-80	1200	32.7
432	7-21-80	2400	32.7
444	7-22-80	1200	32.75
456	7-22-80	2400	32.75
468	7-23-80	1200	32.8
480	7-23-80	2400	32.8
492	7-24-80	1200	32.8
504	7-24-80	2400	32.8
516	7-25-80	1200	32.8
528	7-25-80	2400	32.8
540	7-26-80	1200	32.8
552	7-26-80	2400	32.75
564	7-27-80	1200	32.7
576	7-27-80	2400	32.7

NEVADA POWER COMPANY MONITORING WELL - NORTH 7-4/7-31-80
LOCATION: 14S/65E-8b6 ELEVATION: 1820 FEET ABOVE SEA LEVEL

CUMULATIVE TIME-HOURS	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
588	7-28-80	1200	32.7
600	7-28-80	2400	32.8
612	7-29-80	1200	32.8
624	7-29-80	2400	32.8
636	7-30-80	1200	32.8
648	7-30-80	2400	32.95
660	7-31-80	1200	32.95
672	7-31-80	2400	32.95

NEVADA POWER COMPANY MONITORING WELL - NORTH 7-4/7-31-81
LOCATION: 14S/65E-8bd ELEVATION: 1820 FEET ABOVE SEA LEVEL

CUMULATIVE TIME (HOURS)	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
0	7-04-81	1200	32.85
12	7-04-81	2400	32.85
24	7-05-81	1200	32.85
36	7-05-81	2400	32.85
48	7-06-81	1200	32.85
60	7-06-81	2400	32.85
72	7-07-81	1200	32.85
84	7-07-81	2400	32.85
96	7-08-81	1200	32.9
108	7-08-81	2400	32.9
120	7-09-81	1200	32.95
132	7-09-81	2400	32.95
144	7-10-81	1200	32.95
156	7-10-81	2400	32.95
168	7-11-81	1200	32.9
180	7-11-81	2400	32.9
192	7-12-81	1200	32.9
204	7-12-81	2400	32.9
216	7-13-81	1200	32.95
228	7-13-81	2400	32.95
240	7-14-81	1200	32.95
252	7-14-81	2400	32.95
264	7-15-81	1200	33.0
276	7-15-81	2400	33.0
288	7-16-81	1200	33.0
300	7-16-81	2400	33.0
312	7-17-81	1200	33.0
324	7-17-81	2400	33.0
336	7-18-81	1200	33.0
348	7-18-81	2400	33.0
360	7-19-81	1200	33.0
372	7-19-81	2400	33.05
384	7-20-81	1200	33.05
396	7-20-81	2400	33.05
408	7-21-81	1200	33.05
420	7-21-81	2400	33.05
432	7-22-81	1200	33.05
444	7-22-81	2400	33.0
456	7-23-81	1200	32.95
468	7-23-81	2400	32.95
480	7-24-81	1200	32.95
492	7-24-81	2400	33.0
504	7-25-81	1200	33.0
516	7-25-81	2400	33.0
528	7-26-81	1200	33.05
540	7-26-81	2400	33.05
552	7-27-81	1200	33.1

NEVADA POWER COMPANY MONITORING WELL - NORTH 7-4/7-31-81
LOCATION: 14S/65E-36d ELEVATION: 1820 FEET ABOVE SEA LEVEL

CUMULATIVE TIME-HOURS	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
564	7-27-81	2400	33.1
576	7-28-81	1200	33.1
588	7-28-81	2400	33.1
600	7-29-81	1200	33.1
612	7-29-81	2400	33.1
624	7-30-81	1200	33.1
636	7-30-81	2400	33.1
648	7-31-81	1200	33.1
660	7-31-81	2400	33.1

NEVADA POWER COMPANY MONITORING WELL - NORTH 8-1/8-31-80
LOCATION: 14S/65E-8bd ELEVATION: 1820 FEET ABOVE SEA LEVEL

CUMULATIVE TIME (HOURS)	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
0	8-01-80	1200	32.95
12	8-01-80	2400	32.95
24	8-02-80	1200	33.0
36	8-02-80	2400	33.0
48	8-03-80	1200	33.0
60	8-03-80	2400	33.0
72	8-04-80	1200	33.0
84	8-04-80	2400	33.0
96	8-05-80	1200	33.0
108	8-05-80	2400	33.0
120	8-06-80	1200	33.05
132	8-06-80	2400	33.05
144	8-07-80	1200	33.1
156	8-07-80	2400	33.1
168	8-08-80	1200	33.1
180	8-08-80	2400	33.1
192	8-09-80	1200	33.1
204	8-09-80	2400	33.1
216	8-10-80	1200	33.1
228	8-10-80	2400	33.1
240	8-11-80	1200	33.15
252	8-11-80	2400	33.15
264	8-12-80	1200	33.15
276	8-12-80	2400	33.15
288	8-13-80	1200	33.15
300	8-13-80	2400	33.2
312	8-14-80	1200	33.2
324	8-14-80	2400	33.2
336	8-15-80	1200	33.2
348	8-15-80	2400	33.2
360	8-16-80	1200	33.2
372	8-16-80	2400	33.2
384	8-17-80	1200	33.2
396	8-17-80	2400	33.25
408	8-18 38	1200	33.2
420	8-18-80	2400	33.25
432	8-19-80	1200	33.25
444	8-19-80	2400	33.25
456	8-20-80	1200	33.35
468	8-20-80	2400	33.3
480	8-21-80	1200	33.3
492	8-21-80	2400	33.3
504	8-22-80	1200	33.3
516	8-22-80	2400	33.3
528	8-23-80	1200	33.3
540	8-23-80	2400	33.3
552	8-24-80	1200	33.3
564	8-24-80	2400	33.3
576	8-25-80	1200	33.3
588	8-25-80	2400	33.3
600	8-26-80	1200	33.3

NEVADA POWER COMPANY MONITORING WELL - NORTH 8-1/8-31-80
LOCATION: 14S/65E-8bd ELEVATION: 1820 FEET ABOVE SEA LEVEL

CUMULATIVE TIME (HOURS)	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
612	8-26-80	2400	33.3
624	8-27-80	1200	33.25
636	8-27-80	2400	33.2
648	8-28-80	1200	33.2
660	8-28-80	2400	33.15
672	8-29-80	1200	33.1
684	8-29-80	2400	33.1
696	8-30-80	1200	33.05
708	8-30-80	2400	33.05
720	8-31-80	1200	33.0
722	8-31-80	2400	33.0

NEVADA POWER COMPANY MONITORING WELL - NORTH 8-1/8-31-81
LOCATION: 14S/65E-8bd ELEVATION: 1820 FEET ABOVE SEA LEVEL

CUMULATIVE TIME(HOURS)	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
0	8-01-81	1200	33.1
12	8-01-81	2400	33.1
24	8-02-81	1200	33.1
36	8-02-81	2400	33.1
48	8-03-81	1200	33.1
60	8-03-81	2400	33.1
72	8-04-81	1200	33.1
84	8-04-81	2400	33.1
96	8-05-81	1200	33.1
108	8-05-81	2400	33.1
120	8-06-81	1200	33.1
132	8-06-81	2400	33.1
144	8-07-81	1200	33.1
156	8-07-81	2400	33.1
168	8-08-81	1200	33.1
180	8-08-81	2400	33.1
192	8-09-81	1200	33.1
204	8-09-81	2400	33.1
216	8-10-81	1200	33.15
228	8-10-81	2400	33.1
240	8-11-81	1200	33.1
252	8-11-81	2400	33.05
264	8-12-81	1200	33.0
276	8-12-81	2400	33.0
288	8-13-81	1200	33.0
300	8-13-81	2400	33.05
312	8-14-81	1200	33.1
324	8-14-81	2400	33.1
336	8-15-81	1200	33.1
348	8-15-81	2400	33.1
360	8-16-81	1200	33.1
372	8-16-81	2400	33.1
384	8-17-81	1200	33.1
396	8-17-81	2400	33.1
408	8-18-81	1200	33.1
420	8-18-81	2400	33.1
432	8-19-81	1200	33.1
444	8-19-81	2400	33.1
456	8-20-81	1200	33.1
468	8-20-81	2400	33.1
480	8-21-81	1200	33.1
492	8-21-81	2400	33.1
504	8-22-81	1200	33.1
516	8-22-81	2400	33.1
528	8-23-81	1200	33.15
540	8-23-81	2400	33.15
552	8-24-81	1200	33.2
564	8-24-81	2400	33.2

NEVADA POWER COMPANY MONITORING WELL - NORTH 8-1/8-31-81
LOCATION: 14S/65E-8bd ELEVATION: 1820 FEET ABOVE SEA LEVEL

CUMULATIVE TIME(HOURS)	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
576	8-25-81	1200	33.2
588	8-25-81	2400	33.15
600	8-26-81	1200	33.15
612	8-26-81	2400	33.1
624	8-27-81	1200	33.1
636	8-27-81	2400	33.1
648	8-28-81	1200	33.1
660	8-28-81	2400	33.1
672	8-29-81	1200	33.1
684	8-29-81	2400	33.1
696	8-30-81	1200	33.1
708	8-30-81	2400	33.1
720	8-31-81	1200	33.0
732	8-31-81	2400	33.0

NEVADA POWER COMPANY MONITORING WELL - NORTH 9-1/9-30-80
LOCATION: 14S/65E-8bd ELEVATION: 1820 FEET ABOVE SEA LEVEL

CUMULATIVE TIME (HOURS)	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
0	9-01-80	1200	33.0
12	9-01-80	2400	33.0
24	9-02-80	1200	32.95
36	9-02-80	2400	32.95
48	9-03-80	1200	32.9
60	9-03-80	2400	32.9
72	9-04-80	1200	32.9
84	9-04-80	2400	32.9
96	9-05-80	1200	32.9
108	9-05-80	2400	32.85
120	9-06-80	1200	32.85
132	9-06-80	2400	32.8
144	9-07-80	1200	32.8
156	9-07-80	2400	32.75
168	9-08-80	1200	32.75
180	9-08-80	2400	32.75
192	9-09-80	1200	32.75
204	9-09-80	2400	32.7
216	9-10-80	1200	32.7
228	9-10-80	2400	32.7
240	9-11-80	1200	32.7
252	9-11-80	2400	32.65
264	9-12-80	1200	32.65
276	9-12-80	2400	32.6
288	9-13-80	1200	32.6
300	9-13-80	2400	32.55
312	9-14-80	1200	32.55
324	9-14-80	2400	32.55
336	9-15-80	1200	32.55
348	9-15-80	2400	32.55
360	9-16-80	1200	32.55
372	9-16-80	2400	32.5
384	9-17-80	1200	32.5
396	9-17-80	2400	32.5
408	9-18-80	1200	32.5
420	9-18-80	2400	32.5
432	9-19-80	1200	32.45
444	9-19-80	2400	32.45
456	9-20-80	1200	32.45
468	9-20-80	2400	32.45
480	9-21-80	1200	32.45
492	9-21-80	2400	32.45
504	9-22-80	1200	32.45
516	9-22-80	2400	32.45
528	9-23-80	1200	32.45
540	9-23-80	2400	32.4
552	9-24-80	1200	32.4

NEVADA POWER COMPANY MONITORING WELL - NORTH 9-1/9-30-80
LOCATION: 14S/65E-8bd ELEVATION: 1820 FEET ABOVE SEA LEVEL

CUMULATIVE TIME (HOURS)	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
564	9-24-80	2400	32.4
576	9-25-80	1200	32.4
588	9-25-80	2400	32.4
600	9-26-80	1200	32.4
612	9-26-80	2400	32.4
624	9-27-80	1200	32.4
636	9-27-80	2400	32.35
648	9-28-80	1200	32.35
660	9-28-80	2400	32.35
672	9-29-80	1200	32.35
684	9-29-80	2400	32.35
696	9-30-80	1200	32.35
708	9-30-80	2400	32.35

NEVADA POWER COMPANY MONITORING WELL - NORTH 9-1/9-30-81
LOCATION: 14S/65E-8bd ELEVATION: 1820 FEET ABOVE SEA LEVEL

CUMULATIVE TIME (HOURS)	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
0	9-01-81	1200	33.05
12	9-01-81	2400	33.05
24	9-02-81	1200	33.05
36	9-02-81	2400	33.05
48	9-03-81	1200	33.1
60	9-03-81	2400	33.1
72	9-04-81	1200	33.1
84	9-04-81	2400	33.1
96	9-05-81	1200	33.1
108	9-05-81	2400	33.1
120	9-06-81	1200	33.15
132	9-06-81	2400	33.15
144	9-07-81	1200	33.1
156	9-07-81	2400	33.1
168	9-08-81	1200	33.05
180	9-08-81	2400	33.0
192	9-09-81	1200	33.0
204	9-09-81	2400	32.9
216	9-10-81	1200	32.9
228	9-10-81	2400	32.9
240	9-11-81	1200	32.9
252	9-11-81	2400	32.85
264	9-12-81	1200	32.85
276	9-12-81	2400	32.85
288	9-13-81	1200	32.8
300	9-13-81	2400	32.8
312	9-14-81	1200	32.85
324	9-14-81	2400	32.9
336	9-15-81	1200	32.9
348	9-15-81	2400	32.9
360	9-16-81	1200	32.95
372	9-16-81	2400	32.95
384	9-17-81	1200	32.95
396	9-17-81	2400	32.95
408	9-18-81	1200	32.95
420	9-18-81	2400	32.95
432	9-19-81	1200	32.95
444	9-19-81	2400	32.95
456	9-20-81	1200	32.95
468	9-20-81	2400	32.95
480	9-21-81	1200	32.95
492	9-21-81	2400	32.95
504	9-22-81	1200	32.95
516	9-22-81	2400	32.95
528	9-23-81	1200	32.95
540	9-23-81	2400	33.0
552	9-24-81	1200	33.0

NEVADA POWER COMPANY MONITORING WELL - NORTH 9-1/9-30-81
LOCATION: 14S/65E-8bd ELEVATION: 1020 FEET ABOVE SEA LEVEL

CUMULATIVE TIME (HOURS)	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
564	9-24-81	2400	33.0
576	9-25-81	1200	33.0
588	9-25-81	2400	33.0
600	9-26-81	1200	33.0
612	9-26-81	2400	33.0
624	9-27-81	1200	33.0
636	9-27-81	2400	33.0
648	9-28-81	1200	33.0
660	9-28-81	2400	32.95
672	9-29-81	1200	32.95
684	9-29-81	2400	32.95
696	9-30-81	1200	32.95
708	9-30-81	2400	32.95

NEVADA POWER COMPANY MONITORING WELL - SOUTH 7-4/7-31-80
LOCATION: 14S/65E-9dd ELEVATION: 1810 FEET ABOVE SEA LEVEL

CUMULATIVE TIME (HOURS)	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
0	7-04-80	1200	20.8
12	7-04-80	2400	20.85
24	7-05-80	1200	20.9
36	7-05-80	2400	21.0
48	7-06-80	1200	21.0
60	7-06-80	2400	21.05
72	7-07-80	1200	21.1
84	7-07-80	2400	21.1
96	7-08-80	1200	21.1
108	7-08-80	2400	21.1
120	7-09-80	1200	21.2
132	7-09-80	2400	21.2
144	7-10-80	1200	21.25
156	7-10-80	2400	21.3
168	7-11-80	1200	21.3
180	7-11-80	2400	21.3
192	7-12-80	1200	21.35
204	7-12-80	2400	21.4
216	7-13-80	1200	21.45
228	7-13-80	2400	21.5
240	7-14-80	1200	21.5
252	7-14-80	2400	21.6
264	7-15-80	1200	21.6
276	7-15-80	2400	21.65
288	7-16-80	1200	21.7
300	7-16-80	2400	21.7
312	7-17-80	1200	21.7
324	7-17-80	2400	21.7
336	7-18-80	1200	21.8
348	7-18-80	2400	21.8
360	7-19-80	1200	21.85
372	7-19-80	2400	21.9
384	7-20-80	1200	21.95
396	7-20-80	2400	22.0
408	7-21-80	1200	22.0
420	7-21-80	2400	22.0
432	7-22-80	1200	22.05
444	7-22-80	2400	22.1
456	7-23-80	1200	22.15
468	7-23-80	2400	22.2
480	7-24-80	1200	22.25
492	7-24-80	2400	22.3
504	7-25-80	1200	22.3
516	7-25-80	2400	22.3
528	7-26-80	1200	22.3
540	7-26-80	2400	22.05
552	7-27-80	1200	22.05

NEVADA POWER COMPANY MONITORING WELL - SOUTH 7-4/7-31-80
LOCATION: 14S/65E-8dd ELEVATION: 1810 FEET ABOVE SEA LEVEL

CUMULATIVE TIME-HOURS	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
564	7-27-80	2400	22.1
576	7-28-80	1200	22.15
588	7-28-80	2400	22.15
600	7-29-80	1200	22.2
612	7-29-80	2400	22.2
624	7-30-80	1200	22.45
636	7-30-80	2400	22.5
648	7-31-80	1200	22.5
660	7-31-80	2400	22.5

NEVADA POWER COMPANY MONITORING WELL - SOUTH 7-4/7-31-81
LOCATION: 14S/65E-8dd ELEVATION: 1810 FEET ABOVE SEA LEVEL

CUMULATIVE TIME (HOURS)	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
0	7-04-81	1200	23.65
12	7-04-81	2400	23.75
24	7-05-81	1200	23.80
36	7-05-81	2400	23.9
48	7-06-81	1200	23.9
60	7-06-81	2400	23.95
72	7-07-81	1200	24.0
84	7-07-81	2400	24.0
96	7-08-81	1200	24.1
108	7-08-81	2400	24.1
120	7-09-81	1200	24.2
132	7-09-81	2400	24.2
144	7-10-81	1200	24.3
156	7-10-81	2400	24.2
168	7-11-81	1200	24.15
180	7-11-81	2400	24.1
192	7-12-81	1200	24.2
204	7-12-81	2400	24.1
216	7-13-81	1200	24.0
228	7-13-81	2400	24.15
240	7-14-81	1200	24.3
252	7-14-81	2400	24.35
264	7-15-81	1200	24.4
276	7-15-81	2400	24.45
288	7-16-81	1200	24.5
300	7-16-81	2400	24.55
312	7-17-81	1200	24.6
324	7-17-81	2400	24.6
336	7-18-81	1200	24.6
348	7-18-81	2400	24.6
360	7-19-81	1200	24.75
372	7-19-81	2400	24.8
384	7-20-81	1200	24.8
396	7-20-81	2400	24.8
408	7-21-81	1200	24.85
420	7-21-81	2400	24.9
432	7-22-81	1200	24.9
444	7-22-81	2400	24.9
456	7-23-81	1200	24.95
468	7-23-81	2400	25.0
480	7-24-81	1200	25.0
492	7-24-81	2400	25.0
504	7-25-81	1200	25.0
516	7-25-81	2400	25.05
528	7-26-81	1200	25.05
540	7-26-81	2400	25.1
552	7-27-81	1200	25.05
564	7-27-81	2400	25.0

NEVADA POWER COMPANY MONITORING WELL - SOUTH 7-4/7-31-81
LOCATION: 14S/65E-8dd ELEVATION: 1910 FEET ABOVE SEA LEVEL

CUMULATIVE TIME-HOURS	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
576	7-28-81	1200	25.05
588	7-28-81	2400	25.05
600	7-29-81	1200	25.05
612	7-29-81	2400	25.05
624	7-30-81	1200	25.05
636	7-30-81	2400	25.1
648	7-31-81	1200	25.1
660	7-31-81	2400	25.1

NEVADA POWER COMPANY MONITORING WELL - SOUTH 8-1/8-31-80
LOCATION: 14S/65E-8dd ELEVATION: 1810 FEET ABOVE SEA LEVEL

CUMULATIVE TIME (HOURS)	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
0	8-01-80	1200	22.6
12	8-01-80	2400	22.6
24	8-02-80	1200	22.65
36	8-02-80	2400	22.65
48	8-03-80	1200	22.7
60	8-03-80	2400	22.75
72	8-04-80	1200	22.75
84	8-04-80	2400	22.8
96	8-05-80	1200	22.85
108	8-05-80	2400	22.85
120	8-06-80	1200	22.9
132	8-06-80	2400	22.75
144	8-07-80	1200	22.6
156	8-07-80	2400	22.7
168	8-08-80	1200	22.75
180	8-08-80	2400	22.8
192	8-09-80	1200	22.9
204	8-09-80	2400	22.9
216	8-10-80	1200	22.95
228	8-10-80	2400	23.0
240	8-11-80	1200	23.0
252	8-11-80	2400	23.05
264	8-12-80	1200	23.1
276	8-12-80	2400	23.1
288	8-13-80	1200	23.15
300	8-13-80	2400	23.2
312	8-14-80	1200	24.25
324	8-14-80	2400	23.3
336	8-15-80	1200	23.35
348	8-15-80	2400	23.4
360	8-16-80	1200	23.45
372	8-16-80	2400	23.5
384	8-17-80	1200	23.5
396	8-17-80	2400	23.6
408	8-18-80	1200	23.6
420	8-18-80	2400	23.6
432	8-19-80	1200	23.65
444	8-19-80	2400	23.7
456	8-20-80	1200	23.7
468	8-20-80	2400	23.7
480	8-21-80	1200	23.7
492	8-21-80	2400	23.7
504	8-22-80	1200	23.7
516	8-22-80	2400	23.75
528	8-23-80	1200	23.75
540	8-23-80	2400	23.8
552	8-24-80	1200	23.8

NEVADA POWER COMPANY MONITORING WELL - SOUTH 8-1/8-31-80
LOCATION: 14S/65E-8dd ELEVATION: 1810 FEET ABOVE SEA LEVEL

CUMULATIVE TIME (HOURS)	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
564	8-24-80	2400	23.65
576	8-25-80	1200	23.5
588	8-25-80	2400	23.35
600	8-26-80	1200	23.15
612	8-26-80	2400	23.2
624	8-27-80	1200	23.2
636	8-27-80	2400	23.1
648	8-28-80	1200	23.0
660	8-28-80	2400	22.95
672	8-29-80	1200	22.9
684	8-29-80	2400	22.9
696	8-30-80	1200	22.95
708	8-30-80	2400	23.0
720	8-31-80	1200	22.95
732	8-31-80	2400	22.95

NEVADA POWER COMPANY MONITORING WELL - SOUTH 8-1/8-31-81
LOCATION: 14S/65E-8dd ELEVATION: 1810 FEET ABOVE SEA LEVEL

CUMULATIVE TIME (HOURS)	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
0	8-01-81	1200	25.1
12	8-01-81	2400	25.1
24	8-02-81	1200	25.1
36	8-02-81	2400	25.1
48	8-03-81	1200	25.1
60	8-03-81	2400	25.05
72	8-04-81	1200	25.05
84	8-04-81	2400	25.0
96	8-05-81	1200	25.0
108	8-05-81	2400	25.0
120	8-06-81	1200	24.9
132	8-06-81	2400	24.85
144	8-07-81	1200	24.8
156	8-07-81	2400	24.8
168	8-08-81	1200	24.75
180	8-08-81	2400	24.75
192	8-09-81	1200	24.7
204	8-09-81	2400	24.7
216	8-10-81	1200	24.7
228	8-10-81	2400	24.6
240	8-11-81	1200	24.4
252	8-11-81	2400	24.3
264	8-12-81	1200	24.3
276	8-12-81	2400	24.2
288	8-13-81	1200	24.2
300	8-13-81	2400	24.2
312	8-14-81	1200	240.5
324	8-14-81	2400	24.1
336	8-15-81	1200	24.15
348	8-15-81	2400	24.2
360	8-16-81	1200	24.2
372	8-16-81	2400	24.2
384	8-17-81	1200	24.2
396	8-17-81	2400	24.1
408	8-18-81	1200	24 1
420	8-18-81	2400	24.0
432	8-19-81	1200	24.05
444	8-19-81	2400	24.15
456	8-20-81	1200	24.2
468	8-20-81	2400	24.3
480	8-21-81	1200	24.4
492	8-21-81	2400	24.5
504	8-22-81	1200	24.55
516	8-22-81	2400	24.6
528	8-23-81	1200	24.6
540	8-23-81	2400	24.65
552	8-24-81	1200	24.7

NEVADA POWER COMPANY MONITORING WELL - SOUTH 8-1/8-31-81
LOCATION: 14S/65E-8dd ELEVATION: 1810 FEET ABOVE SEA LEVEL

CUMULATIVE TIME (HOURS)	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
564	8-24-81	2400	24.8
576	8-25-81	1200	24.8
588	8-25-81	2400	24.85
600	8-26-81	1200	24.5
612	8-26-81	2400	24.4
624	8-27-81	1200	24.5
636	8-27-81	2400	24.6
648	8-28-81	1200	24.6
660	8-28-81	2400	24.3
672	8-29-81	1200	24.3
684	8-29-81	2400	24.35
696	8-30-81	1200	24.4
708	8-30-81	2400	24.4
720	8-31-81	1200	24.15
732	8-31-81	2400	24.0

NEVADA POWER COMPANY MONITORING WELL - SOUTH 9-1/9-30-80
LOCATION: 14S/65E-8dd ELEVATION: 1810 FEET ABOVE SEA LEVEL

CUMULATIVE TIME (HOURS)	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
0	9-01-80	1200	22.9
12	9-01-80	2400	22.9
24	9-02-80	1200	22.85
36	9-02-80	2400	22.8
48	9-03-80	1200	22.8
60	9-03-80	2400	22.75
72	9-04-80	1200	22.7
84	9-04-80	2400	22.7
96	9-05-80	1200	22.6
108	9-05-80	2400	22.5
120	9-06-80	1200	22.45
132	9-06-80	2400	22.4
144	9-07-80	1200	22.35
156	9-07-80	2400	22.2
168	9-08-80	1200	22.05
180	9-08-80	2400	22.20
192	9-09-80	1200	22.3
204	9-09-80	2400	22.2
216	9-10-80	1200	22.1
228	9-10-80	2400	22.1
240	9-11-80	1200	22.1
252	9-11-80	2400	22.1
264	9-12-80	1200	22.1
276	9-12-80	2400	22.1
288	9-13-80	1200	22.1
300	9-13-80	2400	22.1
312	9-14-80	1200	22.1
324	9-14-80	2400	22.25
336	9-15-80	1200	22.0
348	9-15-80	2400	21.95
360	9-16-80	1200	21.95
372	9-16-80	2400	21.95
384	9-17-80	1200	21.95
396	9-17-80	2400	21.9
408	9-18-80	1200	21.9
420	9-18-80	2400	21.8
432	9-19-80	1200	21.8
444	9-19-80	2400	21.75
456	9-20-80	1200	21.75
468	9-20-80	2400	21.75
480	9-21-80	1200	21.6
492	9-21-80	2400	21.5
504	9-22-80	1200	21.4
516	9-22-80	2400	21.3
528	9-23-80	1200	21.2
540	9-23-80	2400	21.15
552	9-24-80	1200	21.1

NEVADA POWER COMPANY MONITORING WELL - SOUTH 9-1/9-30-80
LOCATION: 14S/65E-8dd ELEVATION: 1810 FEET ABOVE SEA LEVEL

CUMULATIVE TIME (HOURS)	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
564	9-24-80	2400	21.25
576	9-25-80	1200	21.35
588	9-25-80	2400	21.45
600	9-26-80	1200	21.5
612	9-26-80	2400	21.6
624	9-27-80	1200	21.6
636	9-27-80	2400	21.65
648	9-28-80	1200	21.7
660	9-28-80	2400	21.7
672	9-29-80	1200	21.65
684	9-29-80	2400	21.6
696	9-30-80	1200	21.65
708	9-30-80	2400	21.65

NEVADA POWER COMPANY MONITORING WELL - SOUTH 9-1/9-30-81
LOCATION: 14S/65E-8dd ELEVATION: 1810 FEET ABOVE SEA LEVEL

CUMULATIVE TIME (HOURS)	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
0	9-01-81	1200	24.1
12	9-01-81	2400	24.2
24	9-02-81	1200	24.2
36	9-02-81	2400	24.3
48	9-03-81	1200	24.35
60	9-03-81	2400	24.3
72	9-04-81	1200	24.2
84	9-04-81	2400	24.3
96	9-05-81	1200	24.2
108	9-05-81	2400	24.25
120	9-06-81	1200	24.2
132	9-06-81	2400	24.3
144	9-07-81	1200	24.35
156	9-07-81	2400	24.45
168	9-08-81	1200	24.45
180	9-08-81	2400	24.45
192	9-09-81	1200	24.45
204	9-09-81	2400	24.4
216	9-10-81	1200	24.3
228	9-10-81	2400	24.2
240	9-11-81	1200	24.2
252	9-11-81	2400	24.15
264	9-12-81	1200	24.2
276	9-12-81	2400	24.2
288	9-13-81	1200	24.2
300	9-13-81	2400	24.2
312	9-14-81	1200	24.2
324	9-14-81	2400	24.2
336	9-15-81	1200	24.2
348	9-15-81	2400	24.2
360	9-16-81	1200	24.2
372	9-16-81	2400	24.2
384	9-17-81	1200	24.2
396	9-17-81	2400	24.25
408	9-18-81	1200	24.3
420	9-18-81	2400	24.3
432	9-19-81	1200	24.3
444	9-19-81	2400	24.35
456	9-20-81	1200	24.35
468	9-20-81	2400	24.3
480	9-21-81	1200	24.25
492	9-21-81	2400	24.2
504	9-22-81	1200	24.1
516	9-22-81	2400	24.0
528	9-23-81	1200	23.9
540	9-23-81	2400	23.8
552	9-24-81	1200	23.7

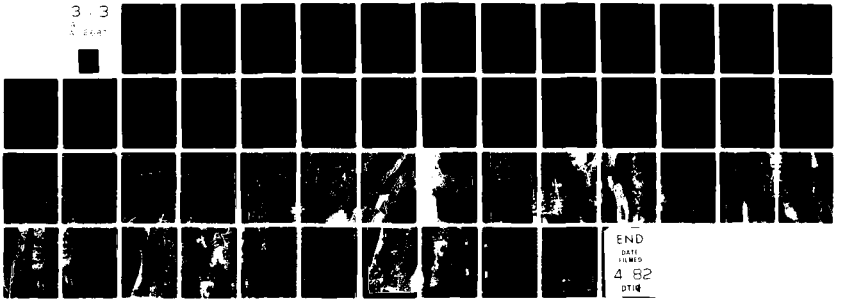
NEVADA POWER COMPANY MONITORING WELL - SOUTH 9-1/9-30-81
LOCATION: 14S/65E-8dd ELEVATION: 1810 FEET ABOVE SEA LEVEL

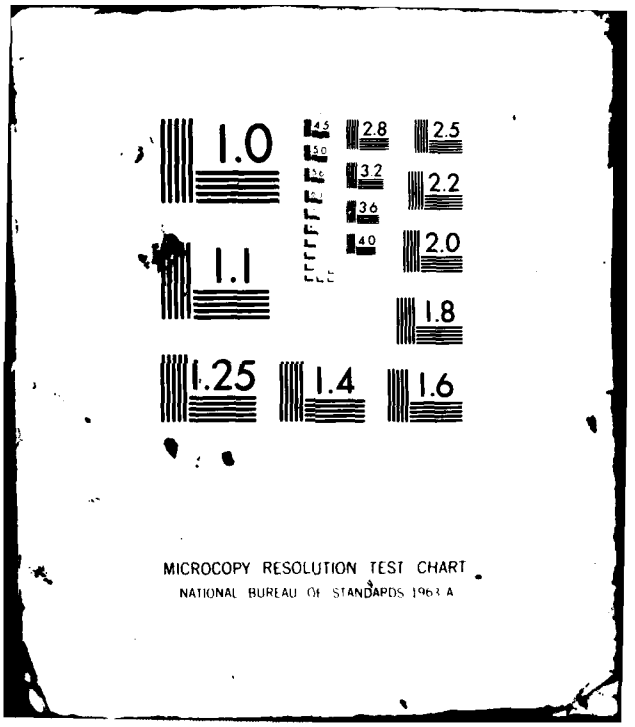
CUMULATIVE TIME (HOURS)	DATE	TIME OF DAY	WATER LEVEL (FEET BELOW MEASURING POINT)
564	9-24-81	2400	23.6
576	9-25-81	1200	23.6
588	9-25-81	2400	23.5
600	9-26-81	1200	23.5
612	9-26-81	2400	23.5
624	9-27-81	1200	23.5
636	9-27-81	2400	23.45
648	9-28-81	1200	23.45
660	9-28-81	2400	23.45
672	9-29-81	1200	23.4
684	9-29-81	2400	23.4
696	9-30-81	1200	23.3
708	9-30-81	2400	23.25

APPENDIX B1.4

SPRING MONITORING DATA

AD-A112 687 ERTEC WESTERN INC LONG BEACH CA F/G 8/8
MX SITING INVESTIGATION. WATER RESOURCES PROGRAM. RESULTS OF RE--ETC(U)
DEC 81 F04704-80-C-0006
UNCLASSIFIED E-TR-57 NL

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4.5
5.0
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963 A

MUDDY RIVER SPRINGS - UPPER MOAPA VALLEY - SPRING MONITORING DATA

FIELD DATA

BALDWIN SPRING

LOCATION: 14S/65E-16BC ELEVATION: 1799.66 FEET AMSL

DATE OF MEASUREMENT	TIME	DISCHARGE (GPM)	TEMP. (C)	SP. COND. uMHOS/CM @ 25 DEGREE C	pH	BICARBONATE (mg/l)
6-28-81	1320	267	32	----	6.9	233
6-29-81	1700	274	--	----	---	---
6-30-81	1000	274	32	----	6.8	233
7-01-81	1230	274	33	----	6.9	---
7-02-81	1030	289	32	----	6.8	---
7-03-81	1235	274	--	----	---	---
7-05-81	0940	274	--	----	---	---
7-06-81	0610	289	--	----	---	---
7-09-81	1655	304	--	----	---	---
7-10-81	1330	274	--	----	---	---
7-11-81	1555	274	--	----	---	---
7-12-81	0805	274	32	1080	6.9	227
	2005	274	32	920	---	224
7-13-81	0755	274	32	1080	6.9	227
	1535	274	32	1010	---	224
7-14-81	0800	274	32	1100	---	227
	1935	274	32	1080	---	227
7-16-81	1220	289	32	1080	7.1	226
7-17-81	1020	289	33	1080	7.3	224
	2210	274	32	1200	7.1	227
7-18-81	1015	246	32	1210	7.0	230
7-19-81	1115	274	32	1000	7.1	227
7-20-81	1040	274	32	1200	7.0	221
	2010	246	32	1025	7.2	227
7-21-81	0935	246	32	1025	7.2	227
	2000	260	32	1100	7.0	224
7-22-81	0820	260	32	1180	7.0	224
7-24-71	1130	260	32	1080	7.0	---
7-25-81	1010	260	32	1100	7.0	210
	1950	246	32	1025	7.1	224
7-26-81	1230	260	32	1100	7.0	207
	1900	246	32	1025	7.2	207
7-27-81	1245	246	32	1025	7.0	210
7-28-81	1000	246	32	1100	7.0	207
7-30-81	0858	246	--	----	---	---
	2000	246	31	1050	---	204
7-31-81	0925	260	--	----	---	---
	1920	246	32	1050	---	204
8-01-81	0730	246	--	----	---	---
	1755	246	33	1100	7.2	207

BALDWIN SPRING (CONT.)

DATE OF MEASUREMENT	TIME	DISCHARGE (GPM)	TEMP. (C)	SP. COND. uMHOS/CM @ 25 DEGREE C	pH	BICARBONATE (mg/l)
8-02-81	0735	246	--	----	---	---
8-03-81	0750	260	--	----	---	---
	1740	260	32	1100	---	202
8-04-81	0807	260	--	----	---	---
	1745	246	33	1100	---	199
8-05-81	0750	260	--	----	---	---
	1750	260	32	1100	---	202
8-06-81	0745	260	--	----	---	---
	1720	260	32	1025	---	202
8-07-81	0725	260	--	----	---	---
	1740	260	32	1025	---	202
8-08-81	0843	260	--	----	---	---
	1715	260	32	1100	---	202
8-09-81	0900	260	--	----	---	---
8-10-81	0914	260	32	----	---	199
8-11-81	1020	246	--	----	---	---
8-12-81	1045	274	--	----	---	---
8-13-81	0811	274	33	1100	7.4	196
	1655	274	--	----	---	---
8-14-81	0726	274	--	----	---	---
	1930	274	33	1125	7.4	199
8-15-81	0950	274	--	----	---	---
8-16-81	1000	289	--	----	---	---
	1840	274	32	1020	7.5	---
8-17-81	1550	274	32	1050	7.3	213
8-18-81	1305	274	32	1020	7.4	210
8-19-81	1940	274	32	1000	7.3	207
8-20-81	1600	274	32	1000	7.3	202
8-21-81	1040	274	33	1100	7.4	207
8-22-81	1050	274	32	1040	7.2	207
8-23-81	1130	274	33	1050	7.4	199
8-24-81	1110	274	32	1000	7.4	199
8-25-81	1755	274	32	1000	7.2	199
8-26-81	1525	274	32	1100	7.2	199
8-27-81	1230	274	--	1020	7.3	204
8-28-81	0845	260	33	1020	---	204
8-29-81	0910	---	33	1000	7.3	204
8-30-81	0940	233	33	1000	7.3	202
8-31-81	1800	260	32	1000	7.4	202
9-01-81	0850	260	33	1020	7.3	202
9-02-81	1255	260	33	1000	7.3	204
9-03-81	0930	260	33	1020	7.4	207
9-04-81	1410	260	33	1000	---	207
9-05-81	1145	260	33	1020	7.2	202
9-06-81	0930	260	33	1020	7.3	207
9-07-81	1635	260	32	1030	7.3	207
9-08-81	1745	260	32	1020	7.4	210
9-09-81	1550	260	32	1020	7.3	204

BALDWIN SPRING (CONT.)

DATE OF MEASUREMENT	TIME	DISCHARGE (GPM)	TEMP. (C)	SP. COND. uMHOS/CM @ 25 DEGREE C	pH	BICARBONATE (mg/l)
9-10-81	1540	260	32	1020	7.3	207
9-11-81	1425	260	32	1020	7.3	207
9-12-81	0945	274	32	1050	7.4	204
9-13-81	0815	260	33	1020	7.3	204
9-14-81	0835	260	32	1020	7.3	207
9-15-81	0835	260	33	1020	7.3	207
9-16-81	0820	260	32	1000	7.3	202
9-17-81	0837	260	32	1000	7.3	202
9-18-81	0835	260	33	1000	7.3	202
9-19-81	0905	260	33	1000	7.3	202
9-20-81	0920	260	33	1020	7.3	204
9-21-81	0815	260	32	1000	7.3	204
9-22-81	1245	260	31	1050	7.2	204
9-23-81	1820	260	31	1020	7.2	207
9-24-81	1415	260	32	1000	7.2	207
9-25-81	0915	260	31	1020	7.2	207
9-26-81	1735	260	31	1000	7.2	207
9-27-81	1020	260	31	1000	7.2	207
9-28-81	1155	260	31	1000	7.2	207
9-29-81	1145	260	31	1000	7.2	207
9-30-81	1010	260	--	1000	7.2	207

MUDDY RIVER SPRINGS - UPPER MOAPA VALLEY - SPRING MONITORING DATA

FIELD DATA

BALDWIN CUT SPRING

LOCATION: 14S/65E-16BC ELEVATION: 1799.66 FEET AMSL

DATE OF MEASUREMENT	TIME	DISCHARGE (GPM)	TEMP. (C)	SP. COND. uMHOS/CM @ 25 DEGREE C	pH	BICARBONATE (mg/l)
6-27-81	1437	197	--	----	---	---
6-28-81	1534	184	32	----	7.2	220
6-29-81	1715	175	--	----	---	---
6-30-81	1105	175	32	----	7.1	229
7-01-81	1225	175	--	----	---	---
7-02-81	1015	175	31	----	7.0	---
7-03-81	1228	175	--	----	---	---
7-05-91	0930	175	--	----	---	---
7-06-81	0600	175	--	----	---	---
7-09-81	1650	175	--	----	---	---
7-10-81	1335	184	--	----	---	---
7-11-91	1550	175	--	----	---	---
7-12-81	0750	175	32	1100	7.2	224
	2020	175	32	1100	---	224
7-13-81	0740	175	31	1100	7.2	224
	1530	184	32	----	---	227
7-14-81	0750	175	32	1100	---	227
	1945	184	32	1080	---	227
7-16-81	1235	175	32	1050	7.2	230
7-17-81	1025	175	32	1100	7.2	224
	2210	175	32	1100	7.1	224
7-18-81	1015	184	32	1200	7.2	224
7-19-81	1100	175	33	970	7.1	230
7-20-81	1040	175	32	1200	7.0	224
	2020	184	32	1000	7.2	224
7-21-81	0925	184	32	1000	7.2	224
	2000	184	32	1000	7.2	221
7-22-81	0820	184	32	1080	7.1	224
7-24-81	1130	184	32	1050	7.1	---
7-25-81	1010	184	32	1080	7.1	207
	2000	184	32	1000	7.2	213
7-26-81	1230	184	32	1100	7.0	213
	1915	184	32	1050	7.2	210
7-27-81	1230	184	32	1025	7.1	207
	2005	184	32	1100	7.1	202
7-30-81	0855	184	--	----	---	---
	1950	184	31	1050	---	207
7-31-81	0910	184	--	----	---	---
	1910	175	32	1000	---	207
8-01-81	0725	175	32	----	---	---
	1550	175	32	1050	7.0	202
8-02-81	0730	175	--	----	---	---

BALDWIN CUT SPRING (CONT.)

DATE OF MEASUREMENT	TIME	DISCHARGE (GPM)	TEMP. (C)	SP. COND. uMHOS/CM @ 25 DEGREE C	pH	BICARBONATE (mg/l)
8-03-81	0745	175	--	----	---	---
	1730	175	32	1150	---	204
8-04-81	0800	175	--	----	---	---
	1735	175	32	1050	---	202
8-05-81	0745	175	--	----	---	---
	1740	175	32	1100	---	202
8-06-81	0740	175	--	----	---	---
	1735	175	32	1050	---	202
8-07-81	0720	175	--	----	---	---
	1745	175	32	1050	---	202
8-08-81	0838	175	--	----	---	---
	1725	175	32	1100	---	202
8-09-81	0905	175	--	----	---	---
8-10-81	0918	175	32	----	---	202
8-11-81	1014	175	--	----	---	---
8-12-81	1040	175	31	----	---	---
8-13-81	0805	175	31	1110	7.6	204
	1700	175	--	----	---	204
8-14-81	1722	175	--	----	---	---
	1915	175	31	1110	7.5	204
8-15-81	0940	175	--	----	---	---
8-16-81	1005	175	--	----	---	---
	1840	175	31	1020	7.4	210
8-17-81	1545	184	31	1020	7.4	213
8-18-81	1305	184	31	1040	7.5	210
8-19-81	1940	184	32	1080	7.5	210
8-20-81	1600	184	32	1020	7.5	207
8-21-81	1040	184	32	1050	7.4	207
8-22-81	1050	184	31	1020	7.4	207
8-23-81	1130	184	32	1020	7.5	199
8-24-81	1115	184	32	1020	7.4	204
8-25-81	1815	184	32	1020	7.4	210
8-26-81	1510	184	32	1100	7.5	207
8-27-81	1200	184	--	1020	7.5	207
8-28-81	0820	184	32	1100	7.4	204
8-29-81	0900	184	32	1010	7.4	202
8-30-81	0813	184	32	1000	7.4	202
8-31-81	1855	175	32	1010	7.4	210
9-01-81	0845	184	32	1020	7.5	202
9-02-81	1310	184	32	1000	7.4	204
9-03-81	0920	175	32	1030	7.5	199
9-04-81	1410	184	33	1050	---	202
9-05-81	1145	184	33	1050	7.4	199
9-06-81	0925	184	32	1050	7.3	182
9-07-81	1630	184	32	1020	7.5	202
9-08-81	1745	184	32	1000	7.4	204
9-09-51	1605	184	32	1000	7.4	202

BALDWIN CUT SPRING (CONT.)

DATE OF MEASUREMENT	TIME	DISCHARGE (GPM)	TEMP. (C)	SP. COND. uMHOS/CM @ 25 DEGREE C	pH	BICARBONATE (mg/l)
9-10-81	1600	184	32	1050	7.4	204
9-11-81	1425	184	32	1020	7.4	204
9-12-81	0945	184	32	1020	7.4	207
9-13-81	0805	184	32	1020	7.4	207
9-14-81	0825	184	32	1020	7.4	204
9-15-81	0830	184	32	1000	7.4	204
9-16-81	0810	184	32	1020	7.4	204
9-17-81	0825	184	32	1020	7.4	202
9-18-81	0820	184	32	1020	7.4	202
9-19-81	0840	184	32	1020	7.4	204
9-20-81	0910	184	32	1050	7.4	202
9-21-81	0805	184	32	1020	7.4	202
9-22-81	1250	184	31	1060	7.2	207
9-23-81	1825	184	31	1050	7.2	207
9-24-81	1420	184	32	1000	7.2	207
9-25-81	0910	184	31	1000	7.3	---
9-26-81	1740	184	31	1000	7.2	207
9-27-81	1020	184	--	1000	7.2	204
9-28-81	1150	184	31	960	7.2	207
9-29-81	1145	184	31	1000	7.2	207
9-30-81	0945	184	--	980	7.4	207

MUDDY RIVER SPRINGS - UPPER MOAPA VALLEY - SPRING MONITORING DATA

FIELD DATA

LEWIS SPRING

LOCATION: 14S/65E-8DD ELEVATION: AT DISCHARGE POINT 1812.41 FEET AMSL

DATE OF MEASUREMENT	TIME	DISCHARGE (GPM)	TEMP. (C)	uMHOS/CM @ 25 DEGREE C	pH	BICARBONATE (mg/l)
6-27-81	1430	15	--	----	---	---
6-28-81	1549	15	30	----	6.9	223
6-30-81	1050	--	30	----	6.8	233
7-1-81	1105	--	31	----	6.9	---
7-2-81	1000	15	30	----	6.9	---
7-5-81	0920	15	--	----	---	---
7-6-81	1750	15	--	----	---	---
7-10-81	1340	15	--	----	---	---
7-12-81	0730	--	30	1100	6.9	230
	2030	15	29	940	---	224
7-13-81	0725	15	30	1100	6.9	227
	1525	15	30	----	---	227
7-14-81	0740	PUMP ON	30	1080	---	224
	2000	PUMP ON	30	1080	---	227
7-16-81	1245	15	31	1020	7.1	228
7-17-81	1040	15	32	1080	7.0	227
	2230	15	31	1100	7.0	227
7-18-81	0950	15	30	1100	7.1	224
7-19-81	1030	15	30	980	7.1	230
7-20-81	1030	15	30	1180	7.0	221
	2030	15	30	1000	7.2	224
7-21-81	0910	15	30	1000	7.2	224
	1945	PUMP ON	30	1080	7.0	224
7-22-81	0750	PUMP ON	30	1080	7.1	224
7-24-81	1110	PUMP ON	30	1050	7.0	---
7-25-81	0945	PUMP ON	30	1050	7.0	210
	2010	PUMP ON	30	1000	7.1	210
7-26-81	1200	15	30	1000	7.0	210
	1725	15	30	1050	6.9	207
7-27-81	1220	15	30	1050	7.0	213
7-28-81	1015	PUMP ON	30	----	---	---
7-30-81	1940	PUMP ON	30	1050	---	213
8-04-81	1725	15	31	1075	---	202
8-06-81	1740	15	31	1000	---	207
8-07-81	1730	15	31	1025	---	201
8-08-81	1700	15	31	1050	---	---
8-10-81	0910	15	--	----	---	---
8-11-81	1000	15	--	----	---	---
8-12-81	1100	15	--	----	---	---
8-13-81	0800	15	31	1100	---	193

LEWIS SPRING (CONT.)

DATE OF MEASUREMENT	TIME	DISCHARGE (GPM)	TEMP. (C)	SP. COND. uMHOS/CM @ 25 DEGREE C	pH	BICARBONATE (mg/l)
8-14-81	0715	15	--	----	---	---
8-15-81	0930	15	--	----	---	---
8-16-81	1011	15	--	----	---	---
8-17-81	1530	14	31	1050	7.2	210
8-18-81	1315	14	32	1050	7.2	210
8-19-81	1950	PUMP ON	32	1000	7.3	212
8-20-81	1610	14	31	1000	7.4	207
8-21-81	1230	14	31	1000	7.2	210
8-22-81	1110	15	31	1000	7.1	204
8-23-81	1140	13	31	1000	7.1	202
8-24-81	1125	PUMP ON	31	950	7.1	199
8-25-81	1830	15	31	1000	7.2	204
8-26-81	1455	15	30	1050	7.2	204
8-27-81	1135	15	31	1000	7.2	210
8-28-81	0800	15	31	1020	7.2	207
8-29-81	0835	15	31	1000	7.2	207
8-30-81	0755	PUMP ON	31	1020	7.2	207
8-31-81	1910	15	31	1000	7.2	207
9-01-81	0825	15	31	1020	7.2	207
9-02-81	1325	15	31	1000	7.2	207
9-03-81	0905	15	31	1020	---	207
9-04-81	1350	15	31	1000	---	207
9-05-81	1130	15	31	1000	7.1	207
9-06-81	0910	15	31	1020	7.1	207
9-07-81	1600	15	31	980	7.2	207
	1847	15	31	990	7.2	213
9-08-81	1755	15	31	1000	7.2	207
9-09-81	1550	15	31	950	7.2	207
9-10-81	1535	15	31	1000	7.2	210
9-11-81	1410	15	31	980	7.2	207
9-12-81	0925	15	31	1000	7.2	210
9-13-81	0750	15	31	1100	7.2	204
9-14-81	0805	15	31	1020	7.2	202
9-15-81	0815	15	31	1040	7.2	204
9-16-81	0800	15	31	1020	7.2	202
9-17-81	0815	15	31	1040	7.2	202
9-18-81	0805	PUMP ON	31	1020	7.2	207
9-21-81	0755	15	31	1020	7.2	210
9-22-81	1235	15	31	1000	7.2	207
9-23-81	1805	15	31	1020	7.2	207
9-24-81	1400	15	31	1000	7.2	207
9-25-81	0845	15	31	1000	7.2	207
9-26-81	1720	15	31	1000	7.2	207
9-27-81	1000	PUMP ON	--	980	7.2	204
9-28-81	1210	15	31	950	7.2	204
9-29-81	1155	15	31	980	7.2	207
9-30-81	0905	15	--	980	7.2	207

MUDDY RIVER SPRINGS - UPPER MOAPA VALLEY - SPRING MONITORING DATA

FIELD DATA

MUDDY BIG SPRING

LOCATION: 14S/65E-21AB ELEVATION: 1769.70 FEET AMSL

DATE OF MEASUREMENT	TIME	DISCHARGE (GPM)	TEMP. (C)	SP. COND. uMHOS/CM @ 25 DEGREE C	pH	BICARBONATE (mg/l)
6-27-81	1450	3577	--	----	---	---
6-28- 1	1332	3577	--	----	---	---
6-29-81	1650	3577	--	----	---	---
7-01-81	1330	3649	33	----	6.9	---
7-02-81	1040	3649	32	----	6.9	---
7-05-81	1000	3649	--	----	---	---
7-06-81	1804	3649	33	----	---	---
7-09-81	1700	3577	--	----	---	---
7-10-81	1320	3649	--	----	---	---
7-11-81	1605	3649	32	1100	7.0	---
7-12-81	0830	3577	32	1100	7.0	230
	2000	3577	32	1125	---	227
7-13-81	0810	3577	32	1150	7.0	224
	1550	3577	32	1010	---	224
7-14-81	0810	3577	32	1180	---	227
	1930	3577	32	1150	---	227
7-16-81	1210	3649	32	1100	7.2	230
7-17-81	1006	3649	32	1080	7.2	227
	2150	3649	32	1100	7.1	227
7-18-81	1045	3649	33	1220	7.1	230
7-19-81	1135	3577	32	1050	7.1	227
7-20-81	1055	3577	32	1200	7.0	227
	2005	3577	32	1050	7.2	224
7-21-81	0950	3577	32	1050	7.1	224
	2010	3577	32	1080	7.2	224
7-22-81	0835	3577	32	1080	7.2	227
7-24-81	1145	3577	32	1050	7.1	---
7-25-81	1030	3577	32	1080	7.0	213
	1945	3577	32	1050	7.1	213
7-26-81	1300	3577	32	1050	7.1	213
	1845	3577	32	1025	7.2	213
7-27-81	1300	3577	32	1025	7.2	213
7-28-81	0950	3577	32	1050	7.1	210
7-30-81	0905	3505	--	----	---	---
	2010	3577	31	1050	7.2	207
7-31-81	0930	3577	--	----	---	---
	1930	3505	32	1050	---	207
8-01-81	0740	3505	--	1150	7.2	204
8-02-81	0740	3505	--	----	---	---
8-03-81	0810	3505	--	----	---	---
	1750	3505	32	1200	---	202

MUDDY BIG SPRING (CONT.)

DATE OF MEASUREMENT	TIME	DISCHARGE (GPM)	TEMP. (C)	SP. COND. uMHOS/CM @ 25 DEGREE C	pH	BICARBONATE (mg/l)
8-04-81	0828	3505	--	----	---	---
	1755	3505	32	1100	---	204
8-05-81	0757	3505	--	----	---	---
	1805	3505	32	1025	---	204
8-06-81	0755	3505	--	----	---	---
	1710	3505	32	1075	---	207
8-07-81	0735	3505	--	----	---	---
	1755	3505	32	1050	---	207
8-08-81	0855	3505	--	----	---	---
	1740	3505	32	1075	---	204
8-09-81	0915	3505	--	----	---	---
8-10-81	0930	3505	--	----	---	---
8-11-81	1030	3505	32	----	---	204
8-12-81	1030	3505	32	----	---	---
8-13-81	0820	3505	32	1115	7.5	207
	1640	3505	--	----	---	---
8-14-81	0830	3505	--	----	---	---
	1945	3505	32	1110	7.5	204
8-15-81	0955	3505	--	----	---	---
8-16-81	0920	3505	--	----	---	---
	1920	3505	32	1100	7.4	213
8-17-81	1610	3505	32	1050	7.4	216
8-18-81	1230	3725	32	1050	7.4	213
8-19-81	1930	3725	32	1050	7.5	210
8-20-81	1230	3725	32	1080	7.3	210
8-21-81	1100	3725	32	1100	7.4	210
8-22-81	1030	3649	32	1050	7.5	210
8-23-81	1110	3577	32	1020	7.5	204
8-24-81	1100	3649	32	1000	7.4	199
8-25-81	1735	3577	32	1000	7.3	207
8-26-81	1548	3577	32	1020	7.4	207
8-27-81	1250	3577	--	1020	7.4	210
8-28-81	0855	3577	32	1020	7.4	207
8-29-81	0910	3577	32	1000	7.4	213
8-30-81	0955	3649	32	1000	7.4	204
8-31-81	1755	3649	32	1000	7.4	207
9-01-81	0905	3577	32	1000	7.3	202
9-02-81	1240	3577	32	1000	7.4	204
9-03-81	0945	3649	32	1100	7.4	210
9-04-81	1425	3649	32	1050	---	207
9-05-81	1210	3725	32	1050	7.2	204
9-06-81	0945	3725	32	1020	7.3	207
9-07-81	1603	3649	--	----	7.3	207
9-08-81	1725	3649	32	1020	7.3	210
9-09-81	1615	3649	32	1050	7.3	207
9-10-81	1620	3577	32	1000	7.3	207
9-11-81	1435	3577	32	1020	7.3	204

MUDDY BIG SPRING (CONT.)

DATE OF MEASUREMENT	TIME	DISCHARGE (GPM)	TEMP. (C)	SP. COND uMHOS/CM @ 25 DEGREE C	pH	BICARBONATE (mg/l)
9-12-81	0950	3577	32	1050	7.3	207
9-13-81	0830	3649	32	1080	7.4	207
9-14-81	0845	3649	32	1080	7.3	207
9-15-81	0850	3649	32	1020	7.4	207
9-16-81	0830	3649	32	1050	7.4	207
9-17-81	0950	3649	32	1020	7.4	207
9-18-81	0845	3649	32	1020	7.3	210
9-19-81	0920	3577	32	1050	7.4	207
9-20-81	0930	3649	32	1050	7.4	207
9-21-81	0830	3649	32	1000	7.4	207
9-22-81	1300	3577	31	1050	7.3	207
9-23-81	1840	3577	31	1080	7.3	207
9-24-81	1445	3577	32	1000	7.2	202
9-25-81	0925	3577	32	1000	7.3	210
9-26-81	1745	3577	32	1020	7.3	207
9-27-81	1105	3649	--	1000	7.3	207
9-28-81	1145	3649	32	1000	7.3	210
9-29-81	1125	3577	32	980	7.2	207
9-30-81	1040	3649	--	1000	7.2	207

MUDDY RIVER SPRINGS - UPPER MOAPA VALLEY - SPRING MONITORING DATA

FIELD DATA

PEDERSON SPRING

LOCATION: 14S/65E-21AA ELEVATION: 1800 FEET(APPROX.) AMSL

DATE OF MEASUREMENT	TIME	DISCHARGE (GPM)	TEMP. (C)	SP COND. uMHOS/CM AT 25 C	pH	BICARBONATE (mg/l)
6-26-81	1425	186	--	----	---	---
6-27-81	1509	186	--	----	---	---
6-28-81	1350	184	32	----	7.0	229
6-29-81	1619	186	--	----	---	---
6-30-81	1147	186	32	----	6.9	229
7-01-81	1947	186	--	----	---	---
7-02-81	1107	186	32	----	6.9	---
7-03-81	1242	186	--	----	---	---
7-06-81	1828	192	--	----	---	---
7-09-81	1715	192	--	----	---	---
7-10-81	1245	192	--	----	---	---
7-11-81	1630	192	--	----	---	---
7-12-81	0950	192	32	1150	7.1	227
	1930	192	32	1100	---	224
7-13-81	0825	192	32	1150	7.2	227
	1600	186	32	1050	---	224
7-14-81	0820	192	32	1150	---	227
	1630	192	32	1150	---	---
7-15-81	1735	192	32	1120	7.2	229
7-16-81	1055	192	33	1080	7.3	227
7-17-81	1145	192	32	----	7.1	230
	2330	192	32	----	7.1	230
7-18-81	1115	192	33	----	7.1	230
7-19-81	185	186	33	1050	7.0	227
7-20-81	1130	186	32	----	7.1	227
	1940	192	32	1050	7.1	224
7-21-81	1025	192	32	1050	7.1	224
	2035	192	32	1180	7.1	224
7-22-81	0900	192	32	1120	7.2	227
7-24-81	1230	192	32	1100	7.1	---
7-25-81	1110	192	32	1100	7.1	213
	1930	192	32	1050	7.1	202
7-26-81	1315	192	32	1100	7.0	218
	1830	192	32	1050	7.1	213
7-27-81	1430	192	32	1050	7.1	221
7-28-81	0920	192	32	1180	7.0	210
7-30-81	0915	192	--	----	---	---
	1950	192	32	1100	7.0	204
7-31-81	0938	192	32	----	---	---
	1945	192	32	1100	7.1	196
8-01-81	0753	192	--	----	---	---
	1825	189	32	1100	7.0	202
8-02-81	0745	192	--	----	---	---
8-03-81	0758	192	--	----	---	---
	1820	192	32	1050	---	210

PEDERSON SPRING (CONT.)

DATE OF MEASUREMENT	TIME	DISCHARGE (GPM)	TEMP (C)	SP COND. uMHOS/CM AT 25 C	pH	BICARBONATE (mg/l)
8-04-81	0813	192	--	----	---	---
	1818	192	32	1100	---	204
8-05-81	0803	192	--	----	---	---
	1820	192	32	1075	---	204
8-06-81	0800	192	--	----	---	---
	1700	186	32	1100	---	204
8-07-81	0740	186	--	----	---	---
	1810	186	32	1100	---	204
8-08-81	0908	189	--	----	---	---
	1755	192	32	1100	---	204
8-09-81	1000	192	--	----	---	---
8-10-81	1015	189	32	----	---	204
8-11-81	1120	192	--	----	---	---
8-12-81	0920	192	--	----	---	---
8-13-81	0838	192	32	----	7.5	207
	1630	192	--	----	---	---
8-14-81	0740	192	--	----	---	---
	2000	192	32	----	7.5	213
8-15-81	1010	192	--	----	---	---
8-17-81	1645	192	32	1020	7.4	210
8-18-81	1210	192	32	1080	7.4	213
8-19-81	1900	192	32	1040	7.4	210
8-20-81	1430	192	32	1080	7.4	207
8-21-81	1300	192	33	1040	7.4	207
8-22-81	1000	192	32	1100	7.4	202
8-23-81	1045	192	32	1080	7.4	204
8-24-81	1005	192	32	1080	7.4	207
8-25-81	1510	192	32	1075	7.2	207
8-26-81	1328	192	32	1050	7.4	204
8-27-81	1318	186	--	1020	7.4	204
8-28-81	0935	192	32	1050	7.3	204
8-29-81	0925	192	33	1020	7.3	204
8-30-81	1013	192	32	1020	7.3	207
8-31-81	1610	192	33	1020	7.3	210
9-01-81	0923	192	33	1000	7.3	204
9-02-81	1224	192	33	1020	7.3	204
9-03-81	1020	192	33	1020	7.4	207
9-04-81	1500	192	33	1000	---	207
9-05-81	1220	192	32	1020	7.2	199
9-06-81	1005	192	33	1080	7.2	207
9-07-81	1505	192	32	1050	7.4	213
9-08-81	1630	192	33	1000	7.3	207
9-09-81	1640	192	32	1050	7.3	207
9-10-81	1700	192	32	1050	7.4	207
9-11-81	1450	192	32	1000	7.3	210
9-12-81	1000	192	32	1050	7.3	210
9-13-81	0850	192	33	1020	7.4	207
9-14-81	0915	192	32	1050	7.3	207
9-15-81	0900	192	32	1020	7.3	207

PEDERSON SPRING (CONT.)

DATE OF MEASUREMENT	TIME	DISCHARGE (GPM)	TEMP (C)	SP COND. uMHOS/CM AT 25 C	pH	BICARBONATE (mg/l)
9-16-81	0847	197	32	1050	7.3	207
9-17-81	0905	192	32	1020	7.3	207
9-18-81	0900	192	32	1050	7.2	204
9-19-81	0935	192	32	1020	7.3	204
9-20-81	0945	192	32	1000	7.3	204
9-21-81	0945	192	32	1020	7.3	202
9-22-81	1315	192	31	1000	7.2	210
9-23-81	1855	192	31	1000	7.2	213
9-24-81	1525	192	32	1000	7.2	210
9-25-81	0950	192	32	1000	7.2	204
9-26-81	1808	192	32	1000	7.2	207
9-27-81	1130	186	31	1000	7.2	204
9-28-81	1100	192	32	1000	7.2	210
9-29-81	1115	192	32	1000	7.2	207
9-30-81	1110	186	--	1000	7.3	207

MUDDY RIVER SPRINGS - UPPER MOAPA VALLEY - SPRING MONITORING DATA

FIELD DATA

WARM SPRING

LOCATION: 14S/65E-21AA ELEVATION: 1809.04 FEET AMSL

DATE OF MEASUREMENT	TIME	DISCHARGE (GPM)	TEMP. (C)	SP. COND. uMHOS/CM @ 25 DEGREE C	pH	BICARBONATE (mg/l)
6-26-81	1543	100	--	----	---	---
6-27-81	1503	100	--	----	---	---
6-28-81	1410	100	32	----	7.0	226
6-29-81	1610	100	--	----	---	---
6-30-81	1225	102	32	----	7.0	233
7-01-81	1942	102	--	----	---	---
7-02-81	1126	100	32	----	7.0	---
7-03-81	1348	100	--	----	---	---
7-05-81	1030	104	32	----	7.0	---
7-06-81	1820	104	--	----	---	---
7-09-81	1745	100	--	----	---	---
7-10-81	1228	100	--	----	---	---
7-11-81	1625	100	--	----	---	---
7-12-81	0912	100	32	1180	7.0	224
	1930	100	31	1100	---	227
7-13-81	0850	100	32	1150	7.0	224
	1630	100	32	1060	---	230
7-14-81	0855	100	32	1100	---	224
	1800	100	32	1150	---	227
7-15-81	1730	100	32	1100	7.2	227
7-16-81	1105	100	32	1100	7.2	227
7-17-81	1130	100	32	1250	7.1	227
	2315	100	32	1200	7.1	227
7-18-81	1115	96	33	1250	7.1	227
7-19-81	1150	100	33	1050	7.1	227
7-20-81	1130	96	33	1180	7.0	224
	2030	100	32	1050	7.2	227
7-21-81	1015	100	32	1050	7.2	227
	2035	100	32	1180	7.0	227
7-22-81	0900	100	32	1150	7.1	224
7-24-81	1235	100	32	1150	7.1	---
7-25-81	1110	100	32	1120	7.0	216
	1920	100	32	1050	7.1	210
7-26-81	1315	100	32	1100	7.0	213
	1825	100	32	1050	7.1	207
7-27-81	1430	100	32	1075	7.1	210
7-28-81	0920	98	32	1100	7.0	210
7-30-81	0930	100	--	----	---	---
	1945	100	--	1180	7.1	207
7-31-81	0935	100	--	----	---	---

WARM SPRING (CONT.)

DATE OF MEASUREMENT	TIME	DISCHARGE (GPM)	TEMP. (C)	SP. COND. uMHOS/CM @ 25 DEGREE C	pH	BICARBONATE (mg/l)
	1940	100	32	1180	7.1	204
8-01-81	0750	100	--	----	---	---
	1830	100	--	1180	7.2	204
8-02-81	0750	100	--	----	---	---
8-03-81	0802	100	--	----	---	---
	1815	100	33	1150	---	202
8-04-81	0817	100	--	----	---	---
	1805	100	32	1150	---	202
8-05-81	0815	100	--	----	---	---
	1810	96	33	1150	---	202
8-06-81	0803	100	--	----	---	---
	1650	100	32	1125	---	202
8-07-81	0742	100	--	----	---	---
	1820	100	32	1150	---	202
8-08-81	0904	100	--	----	---	---
	1810	100	32	1100	---	202
8-09-81	0910	100	--	----	---	---
8-10-81	1011	100	32	1125	---	202
8-11-81	1100	100	--	----	---	---
8-12-81	0915	100	--	----	---	---
8-13-81	0830	100	32	1110	7.4	188
	1622	100	--	----	---	---
8-14-81	0735	100	--	----	---	---
	2010	100	32	1110	7.5	190
8-15-81	1000	100	--	----	---	---
8-16-81	0900	100	--	----	---	---
8-17-81	1645	100	32	1080	7.2	210
8-18-81	1210	100	32	1050	7.4	210
8-19-81	1900	100	31	1090	7.3	207
8-20-81	1430	100	32	1050	7.4	207
8-21-81	1310	100	32	1040	7.3	207
8-22-81	1000	100	32	1050	7.3	207
8-23-81	1050	100	32	1050	7.3	202
8-24-81	1000	100	32	1020	7.3	204
8-25-81	1505	100	32	1050	7.1	202
8-26-81	1520	100	32	1020	7.4	204
8-27-81	1310	100	--	1020	7.3	202
8-28-81	0925	100	33	1020	7.3	202
8-29-81	0920	96	33	1020	7.3	202
8-30-81	1007	100	33	1020	7.4	202
8-31-81	1620	100	33	1020	7.3	202
9-01-81	0918	100	32	1010	7.3	202
9-02-81	1220	100	33	1020	7.3	202
9-03-81	1015	96	32	1050	7.4	207
9-04-81	1500	100	33	1020	---	204
9-05-81	1220	100	32	1050	7.2	204
9-06-81	1005	100	32	1080	7.2	204

WARM SPRING (CONT.)

DATE OF MEASUREMENT	TIME	DISCHARGE (GPM)	TEMP. (C)	SP. COND. uMHOS/CM @ 25 DEGREE C	pH	BICARBONATE (mg/l)
9-07-81	1500	100	32	1080	7.3	202
9-08-81	1630	100	32	1050	7.2	207
9-09-81	1635	100	32	1050	7.3	204
9-10-81	1705	100	32	1050	7.3	204
9-11-81	1450	100	32	1020	7.3	207
9-12-81	1000	100	32	1050	7.3	204
9-13-81	0845	96	32	1050	7.4	207
9-14-81	0910	96	32	1000	7.3	204
9-15-81	0855	96	32	1000	7.4	204
9-16-81	0840	96	32	1050	7.4	210
9-17-81	0900	96	32	1000	7.3	207
9-18-81	0855	96	32	1020	7.3	202
9-19-81	0930	96	32	1020	7.4	207
9-20-81	0940	96	32	1000	7.3	204
9-21-81	0937	96	32	1000	7.4	204
9-22-81	1320	100	31	1020	7.3	207
9-23-81	1850	100	31	1000	7.3	210
9-24-81	1530	100	32	1000	7.2	207
9-25-81	0955	100	32	1040	7.2	207
9-26-81	1800	100	32	1000	7.2	207
9-27-81	1130	100	32	1000	7.2	207
9-28-81	1115	100	32	1000	7.2	207
9-29-81	1115	100	32	1000	7.2	207
9-30-81	1120	100	--	1000	7.2	207

APPENDIX B1.5

WATER CHEMISTRY DATA

COYOTE SPRING CARBONATE AQUIFER TEST
LABORATORY WATER CHEMISTRY DATA
LOCATION: 13S/63E-23DD CE-DT-5

SAMPLE DATE:	8-03-81	8-12-81	8-31-81	9-14-81	9-27-81
pH	7.5	7.5	7.5	7.5	7.6
SPECIFIC CONDUCTANCE	780	783	770	770	770
ALKALINITY (AS CACO3)	240	260	250	240	250
TOTAL DISSOLVED SOLIDS	420	396	400	400	504
HARDNESS, TOTAL, AS CACO3	210	210	209	207	209
LANGLIER INDEX	0.2	0.1	0.1	0	0.2
SILICA (SIO2)	36	33	36	33	32
ANIONS (mg/l)					
BICARBONATE (HCO3)	293	317	304	292	304
CARBONATE (CO3)	0.2	0.5	0.4	0.4	0.6
CHLORIDE (CL)	32	36	37	38	39
SULFATE (SO4)	98	99	95	100	94
NITRATE (AS N)	ND	ND	ND	0.5	0.4
FLUORIDE (F))	1.7	1.9	1.7	1.9	1.8
CATIONS (mg/l)					
SODIUM (NA)	81	80	81	78	81
POTASSIUM (K)	12	12	12	12	12
CALCIUM (CA)	49	49	49	47	49
MAGNESIUM (MG)	21	21	21	22	21
TRACE ELEMENTS (ug/l)					
SILVER (AG)	ND	7.0	ND	ND	ND
ARSENIC (AS)	4.7	2.0	11	9.1	10
BORON (B)	310	340	320	320	210
BARIUM (BA)	79	66	78	66	70
CADMIUM (CD)	ND	ND	ND	ND	ND
CHROMIUM (CR)	ND	ND	ND	ND	ND
COPPER (CU)	ND	16	12	27	ND
IRON (FE)	31	32	40	83	30
MERCURY (HG)	0.3	ND	0.5	0.5	ND
MANGANESE (MN)	ND	ND	ND	ND	12
LEAD (PB)	ND	ND	ND	ND	2.7
SELENIUM (SE)	3.2	3.0	ND	ND	ND
ZINC (ZN)	23	17	23	50	ND
CYANIDE (CN)	6.0	ND	ND	ND	ND

ND: NOT DETECTED.
TOTAL DISSOLVED SOLIDS DETERMINED BY RESIDUE-ON-EVAPORATION AT 180 DEG. C.

C E - D T - 5

FIELD WATER CHEMISTRY DATA

DATE OF MEASUREMENT	TIME	SP. COND. UMHOS/CM @ 25 DEGREE C	TEMP. (C)	pH	BICARBONATE (mg/l)
7-10-81	----	910	--	---	---
7-10-81	0055	720	--	7.0	252
	0210	780	--	6.9	252
	0300	820	--	6.9	252
	0430	820	--	7.0	252
	0600	840	--	7.0	256
7-12-81	1046	900	36	---	256
	1051	900	36	7.2	256
	1056	900	36	7.2	256
	1101	850	36	7.1	---
	1106	880	36	7.1	252
	1111	920	36	7.1	256
	1116	900	36	7.2	252
	1121	900	36	7.2	252
	1126	900	36	7.2	249
	1131	900	36	7.1	252
	1136	880	36	7.1	252
	1141	880	36	7.0	256
	1211	880	36	6.9	256
	1241	880	36	7.0	252
	1311	900	36	6.8	256
	1341	900	35	6.9	256
	1411	950	36	7.0	256
	1441	950	36	6.9	256
	1541	980	36	---	256
	1641	900	36	---	259
	1741	830	--	6.8	252
	1841	820	--	7.1	252
	1941	840	--	---	249
	2041	860	35	7.1	252
	2141	910	35	7.1	256
	2241	940	35	6.9	259
7-13-81	1041	900	36	7.1	252
	2241	940	36	---	252
7-14-81	1105	835	36	---	256
7-14-81	----	---	--	---	---
7-14-81	----	---	--	---	---
7-14-81	----	---	--	---	---

DATE OF MEASUREMENT	TIME	SP. COND. UMHOS/CM @ 25 DEGREE C	TEMP. (C)	pH	BICARBONATE (mg/l)
7-17-81	1312	---	--	---	---
	1400	---	36	7.0	256
	1405	---	37	7.0	256
	1410	---	37	7.0	262
	1415	---	36	7.1	256
	1445	---	36	7.1	253
	1515	---	36	7.0	253
	1545	---	36	7.0	256
	1615	---	36	7.1	253
	1645	---	36	7.0	250
	1715	---	36	7.0	266
	2215	---	36	7.0	260
	1730	---	36	7.0	256
7-19-81	0930	---	36	7.0	253
	2140	---	36	7.0	256
7-20-81	0920	---	36	7.0	259
	2130	---	36	7.0	256
7-21-81	----	---	--	--	---
7-22-81	0910	---	36	7.0	250
	1113	---	--	---	---
7-23-81	----	---	--	---	---
7-24-81	1930	---	--	---	---
	2110	---	36	7.0	259
7-25-81	1030	---	35	7.0	256
	2210	---	36	7.0	256
7-26-81	1100	---	35	7.0	253
	2145	---	35	7.0	256
7-27-81	1020	---	35	7.0	256
	2315	---	36	7.0	256
7-28-81	0717	---	--	---	---
7-29-81	----	---	--	---	---
7-30-81	2221	---	--	---	---
7-31-81	1030	900	35	7.0	232
	2130	900	35	7.0	230
8-1-81	1030	900	36	---	232
	2200	920	36	---	235
8-2-81	1030	910	36	7.0	229
	2230	920	35	7.0	230
8-3-81	0620	920	36	7.0	230
	1025	920	36	7.0	230
8-4-81	1110	915	36	7.0	230
	2220	900	35	6.9	224
8-5-81	1030	920	36	6.9	227
	2215	915	36	---	230
8-6-81	1020	900	36	---	230
	2205	920	36	---	230
8-7-81	1030	905	36	---	230
8-10-81	0730	925	35	7.4	227
8-11-81	0915	905	36	7.4	224
	2145	930	35	7.5	230

DATE OF MEASUREMENT	TIME	SP. COND UMHOS/CM @ 25 DEGREE C	TEMP. (C)	pH	BICARBONATE (mg/l)
8-12-81	0715	895	36	7.4	232
	1130	900	35	7.4	227
8-13-81	0630	925	35	7.4	227
	2200	900	36	7.4	227
8-14-81	1200	925	35	7.4	227
	2120	925	36	7.5	224
8-15-81	1030	910	36	7.5	227
	2210	920	35	7.5	227
8-16-81	0800	910	36	7.4	227
	1930	900	35	7.4	235
8-19-81	0715	890	35	7.3	230
	1910	870	36	7.3	230
8-30-81	0700	890	36	7.2	230
	1940	850	36	7.3	230
8-31-81	0715	915	36	7.4	230
	2015	890	36	7.4	230
9-1-81	0725	920	36	7.3	230
	2045	895	36	7.4	230
9-2-81	0730	910	36	7.4	230
	1930	890	36	7.3	224
9-3-81	0805	870	36	7.4	227
	2030	850	36	---	230
9-5-81	0850	850	36	7.2	227
	2020	800	36	7.2	227
9-6-81	0815	880	36	7.4	227
	2010	900	36	7.3	230
9-7-81	0740	880	36	7.3	230
	1910	880	36	7.3	230
9-8-81	0820	860	37	7.4	232
	2000	880	37	7.4	227
9-9-81	0825	900	36	7.3	230
	2040	880	36	7.3	230
9-10-81	0810	900	36	7.3	232
	2010	900	36	7.3	230
9-11-81	0810	880	36	7.3	230
	2035	880	36	7.3	230
9-12-81	1050	880	36	7.4	230
	1930	880	36	7.3	232
9-13-81	0705	890	36	7.3	230
	1900	890	36	7.3	230
9-14-81	0700	910	36	7.4	230
	2005	900	36	7.3	230
9-15-81	0720	900	36	7.2	230
	2015	900	36	7.3	230
9-16-81	0700	880	36	7.3	230
	1905	880	36	7.3	230
9-17-81	0725	880	36	7.3	230
	1725	880	36	7.3	230

DATE OF MEASUREMENT	TIME	SP. COND. UMHOS/CM @ 25 DEGREE C	TEMP. (C))	pH	BICARBONATE (mg/l)
9-18-81	1855	880	36	7.3	230
9-21-81	0705	860	36	7.2	230
	2010	820	36	7.3	230
9-22-81	0810	850	36	7.3	230
	1950	880	36	7.2	230
9-25-81	0815	800	36	7.3	232
	1825	820	36	7.3	229
9-26-81	0940	800	36	7.3	229
	1910	800	36	7.3	229
9-27-81	0720	800	36	7.3	229
	1830	800	36	7.3	229
	2139	---	--	---	---

MUDDY RIVER SPRINGS - UPPER MOAPA VALLEY
LABORATORY WATER CHEMISTRY DATA

LOCATION:	BALDWIN SPRING 14S/65E-16BC		BALDWIN CUT SPRING 14S/65E-16BC	
SAMPLE DATE:	6-05-81	9-30-81	6-05-81	9-30-81
pH	7.8	7.3	7.8	7.2
SPECIFIC CONDUCTANCE	870	930	837	950
ALKALINITY (AS CACO3)	220	220	220	220
TOTAL DISSOLVED SOLIDS	487	634	488	620
HARDNESS, TOTAL, AS CACO3	281	271	278	272
LANGLIER INDEX	0.4	0	0.4	-0.1
SILICA (SIO2)	31	28	29	29
ANIONS (mg/l)				
BICARBONATE (HCO3)	267	268	267	268
CARBONATE (CO3)	0.8	0.2	0.8	0.2
CHLORIDE (CL)	61	64	64	63
SULFATE (SO4)	170	170	190	180
NITRATE (AS N)	1.2	0.6	0.6	0.6
FLUORIDE (F))	2.0	2.0	2.4	1.9
CATIONS (mg/l)				
SODIUM (NA)	95	90	94	90
POTASSIUM (K)	11	11	11	11
CALCIUM (CA)	65	63	66	64
MAGNESIUM (MG)	29	28	28	28
TRACE ELEMENTS (ug/l)				
SILVER (AG)	ND	ND	ND	ND
ARSENIC (AS)	13	24	15	21
BORON (B)	270	260	310	280
BARIUM (BA)	47	49	49	48
CADMIUM (CD)	ND	ND	ND	ND
CHROMIUM (CR)	ND	ND	ND	ND
COPPER (CU)	ND	ND	ND	ND
IRON (FE)	53	60	64	50
MERCURY (HG)	ND	ND	ND	ND
MANGANESE (MN)	ND	ND	17	ND
LEAD (PB)	2.6	ND	ND	ND
SELENIUM (SE)	ND	11	ND	14
ZINC (ZN)	20	ND	34	10
CYANIDE (CN)	ND	ND	ND	ND

ND: NOT DETECTED
TOTAL DISSOLVED SOLIDS DETERMINED BY RESIDUE-ON-EVAPORATION AT 180 DEG. C

MUDDY RIVER SPRINGS - UPPER MOAPA VALLEY
LABORATORY WATER CHEMISTRY DATA

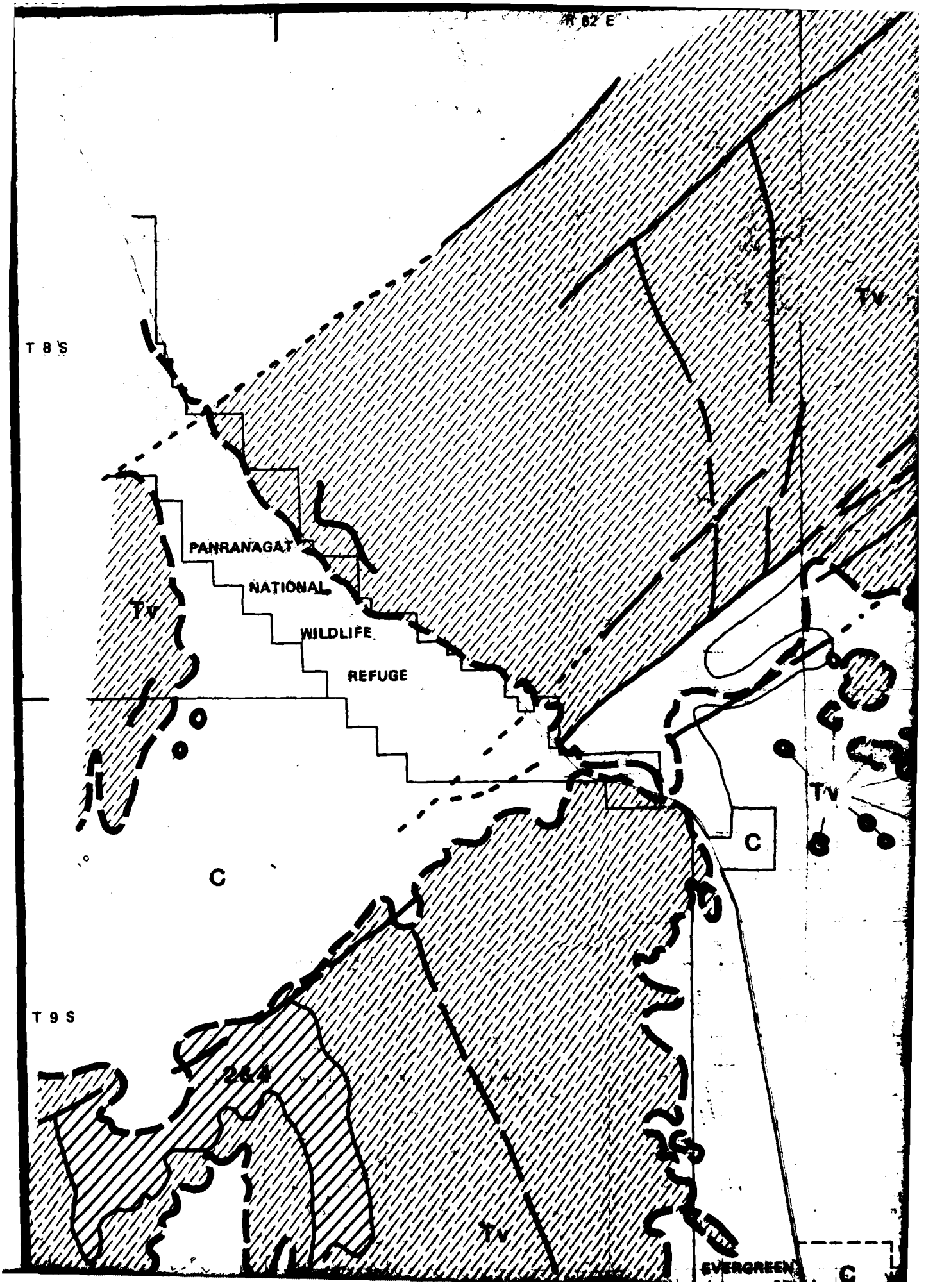
LOCATION:	MUDDY SPRING 14S/65E-16AD		LEWIS SPRING 14S/65E-8DD	
SAMPLE DATE:	6-05-81	9-30-81	6-05-81	9-30-81
pH	7.8	7.4	NA	7.5
SPECIFIC CONDUCTANCE	930	910	NA	930
ALKALINITY (AS CACO3)	210	220	NA	225
TOTAL DISSOLVED SOLIDS	494	630	592	636
HARDNESS, TOTAL, AS CACO3	280	274	280	269
LANGLIER INDEX	0.4	0	0.4	0.1
SILICA (SIO2)	31	28	25	29
ANIONS (mg/l)				
BICARBONATE (HCO3)	255	268	255	270
CARBONATE (CO3)	0.7	0.3	0.7	0.4
CHLORIDE (CL)	65	66	73	60
SULFATE (SO4)	170	180	170	150
NITRATE (AS N)	0.7	0.6	0.6	0.6
FLUORIDE (F))	1.9	2.0	1.8	1.9
CATIONS (mg/l)				
SODIUM (NA)	99	96	92	90
POTASSIUM (K)	11	12	11	12
CALCIUM (CA)	66	63	66	64
MAGNESIUM (MG)	28	28	28	27
TRACE ELEMENTS (ug/l)				
SILVER (AG)	10	ND	5.0	ND
ARSENIC (AS)	12	20	13	20
BORON (B)	270	240	290	220
BARIUM (BA)	49	46	52	48
CADMIUM (CD)	ND	ND	ND	ND
CHROMIUM (CR)	ND	ND	ND	ND
COPPER (CU)	ND	ND	ND	ND
IRON (FE)	ND	80	ND	40
MERCURY (HG)	ND	0.7	ND	0.3
MANGANESE (MN)	ND	ND	ND	ND
LEAD (PB)	ND	1.8	2.2	ND
SELENIUM (SE)	ND	ND	ND	8.6
ZINC (ZN)	25	12	ND	19
CYANIDE (CN)	ND	ND	ND	ND

ND: NOT DETECTED NA: NOT ANALYZED
TOTAL DISSOLVED SOLIDS DETERMINED BY RESIDUE-ON-EVAPORATION AT 180 DEG. C.

UDDY RIVER SPRINGS - UPPER MOAPA VALLEY
LABORATORY WATER CHEMISTRY DATA

LOCATION:	WARM SPRING 14S/65E-21AA		PEDERSON SPRING 14S/65E-21AA	
SAMPLE DATE:	6-05-81	9-30-81	6-05-81	9-30-81
pH	7.7	7.5	7.7	7.6
SPECIFIC CONDUCTANCE	744	940	841	950
ALKALINITY (AS CACO3)	225	220	225	220
TOTAL DISSOLVED SOLIDS	385	604	456	594
HARDNESS, TOTAL, AS CACO3	282	279	280	280
LANGLIER INDEX	0.3	0.1	0.3	0.2
SILICA (SIO2)	30	28	30	28
ANIONS (mg/l)				
BICARBONATE (HCO3)	274	268	274	268
CARBONATE (CO3)	0.6	0.4	0.6	0.5
CHLORIDE (CL)	64	64	57	64
SULFATE (SO4)	190	190	190	190
NITRATE (AS N)	1.1	1.0	0.6	0.5
FLUORIDE (F))	2.4	2.1	2.4	2.0
CATIONS (mg/l)				
SODIUM (NA)	98	94	100	96
POTASSIUM (K)	11	11	11	11
CALCIUM (CA)	67	66	66	66
MAGNESIUM (MG)	28	28	28	28
TRACE ELEMENTS (ug/l)				
SILVER (AG)	ND	ND	ND	ND
ARSENIC (AS)	14	39	16	36
BORON (B)	310	250	310	240
BARIUM (BA)	51	62	47	48
CADMIUM (CD)	ND	ND	ND	ND
CHROMIUM (CR)	ND	ND	ND	ND
COPPER (CU)	ND	ND	ND	18
IRON (FE)	ND	30	ND	70
MERCURY (HG)	ND	0.5	0.5	0.4
MANGANESE (MN)	ND	ND	ND	ND
LEAD (PB)	ND	ND	ND	1.6
SELENIUM (SE)	ND	20	ND	10
ZINC (ZN)	11	10	40	12
CYANIDE (CN)	ND	ND	ND	ND

ND: NOT DETECTED
TOTAL DISSOLVED SOLIDS DETERMINED BY RESIDUE-ON-EVAPORATION AT 180 DEG. C.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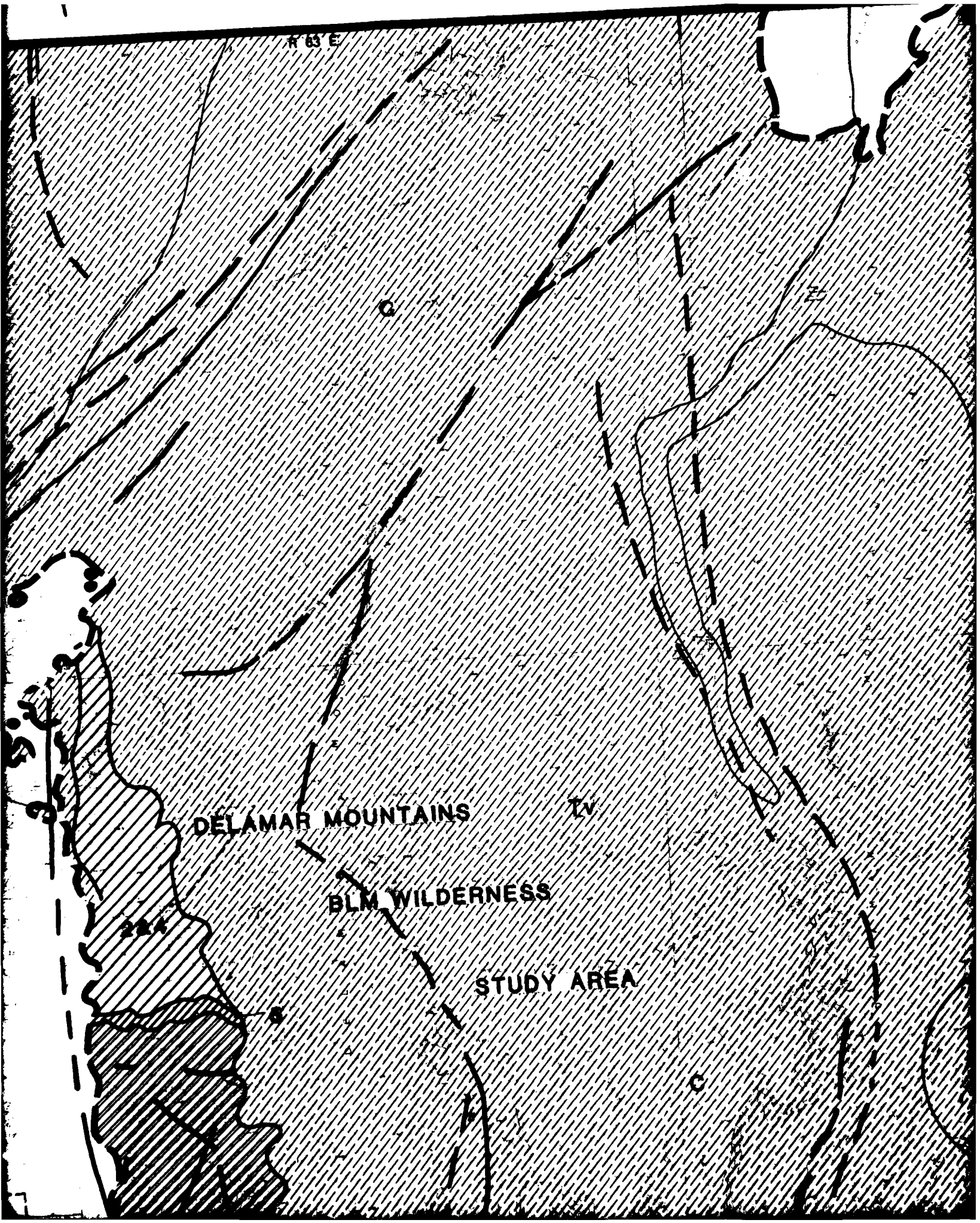
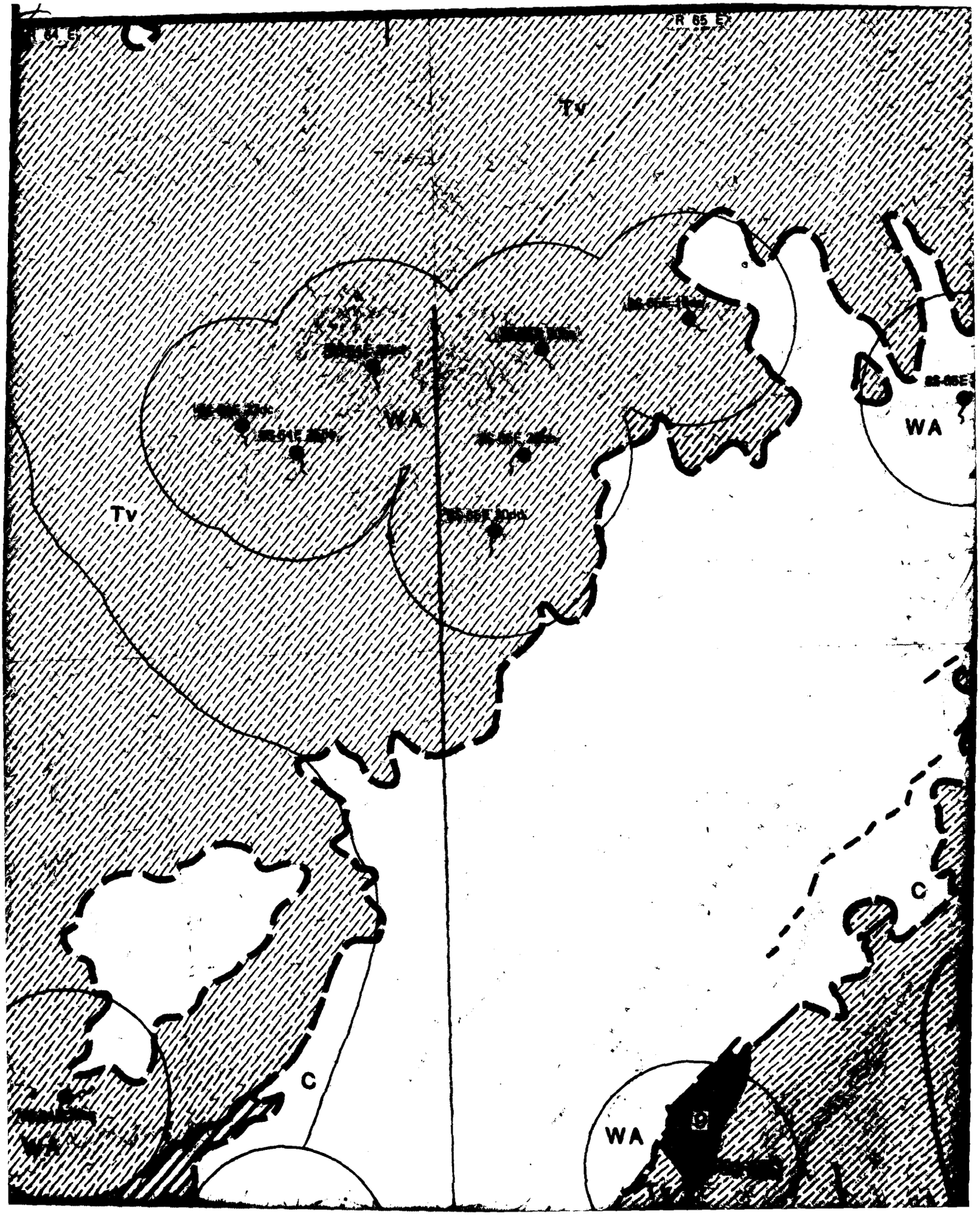
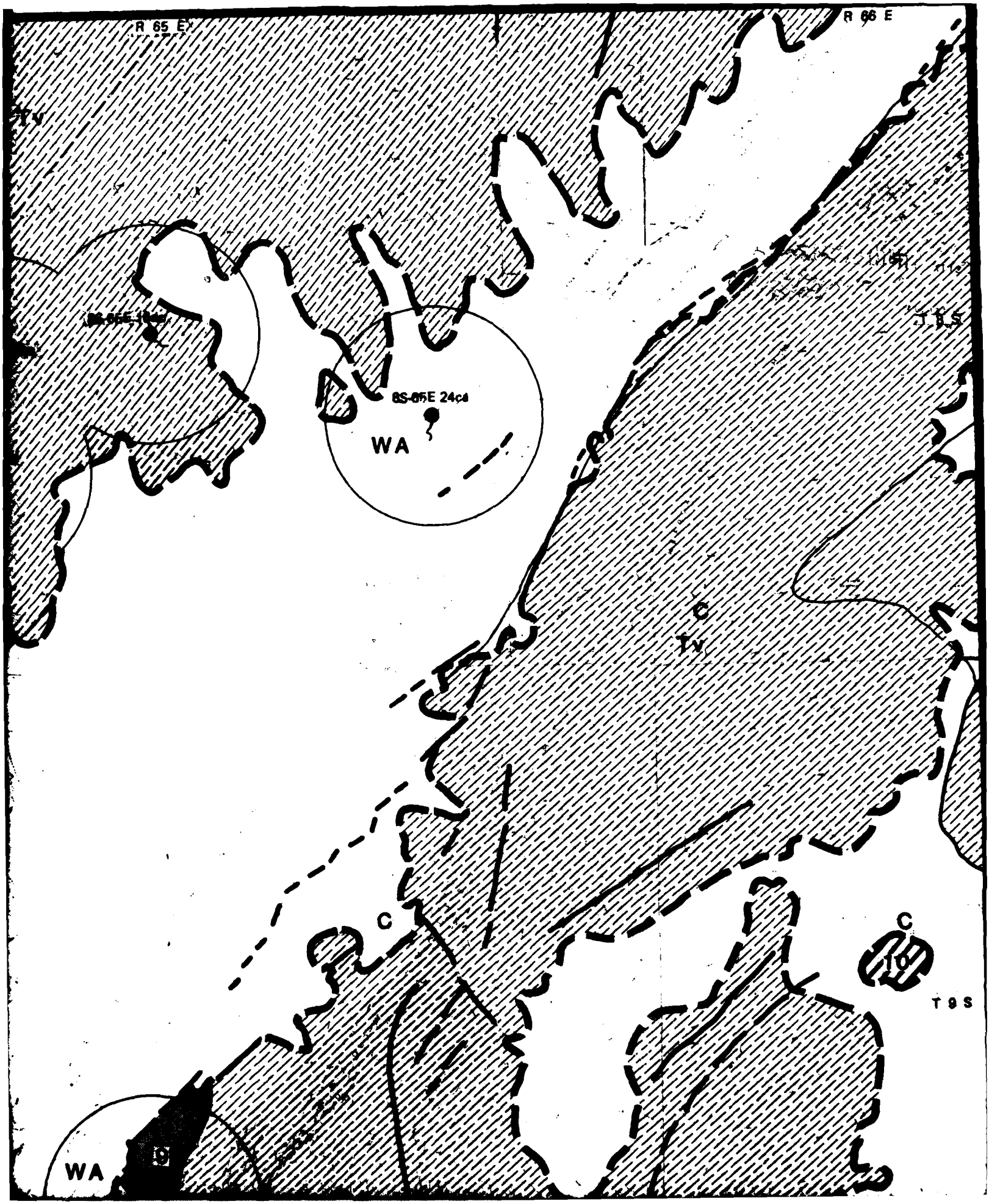
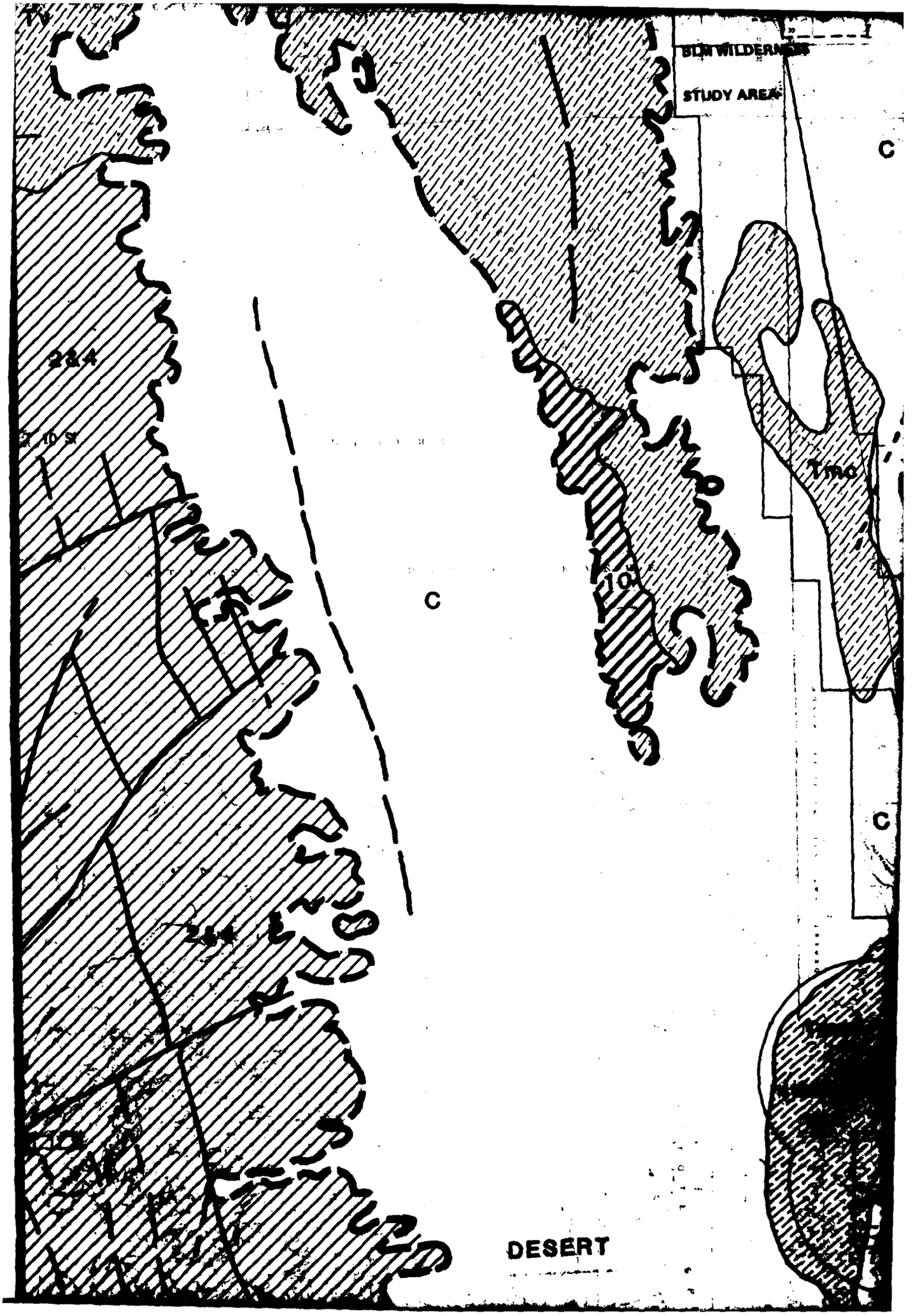
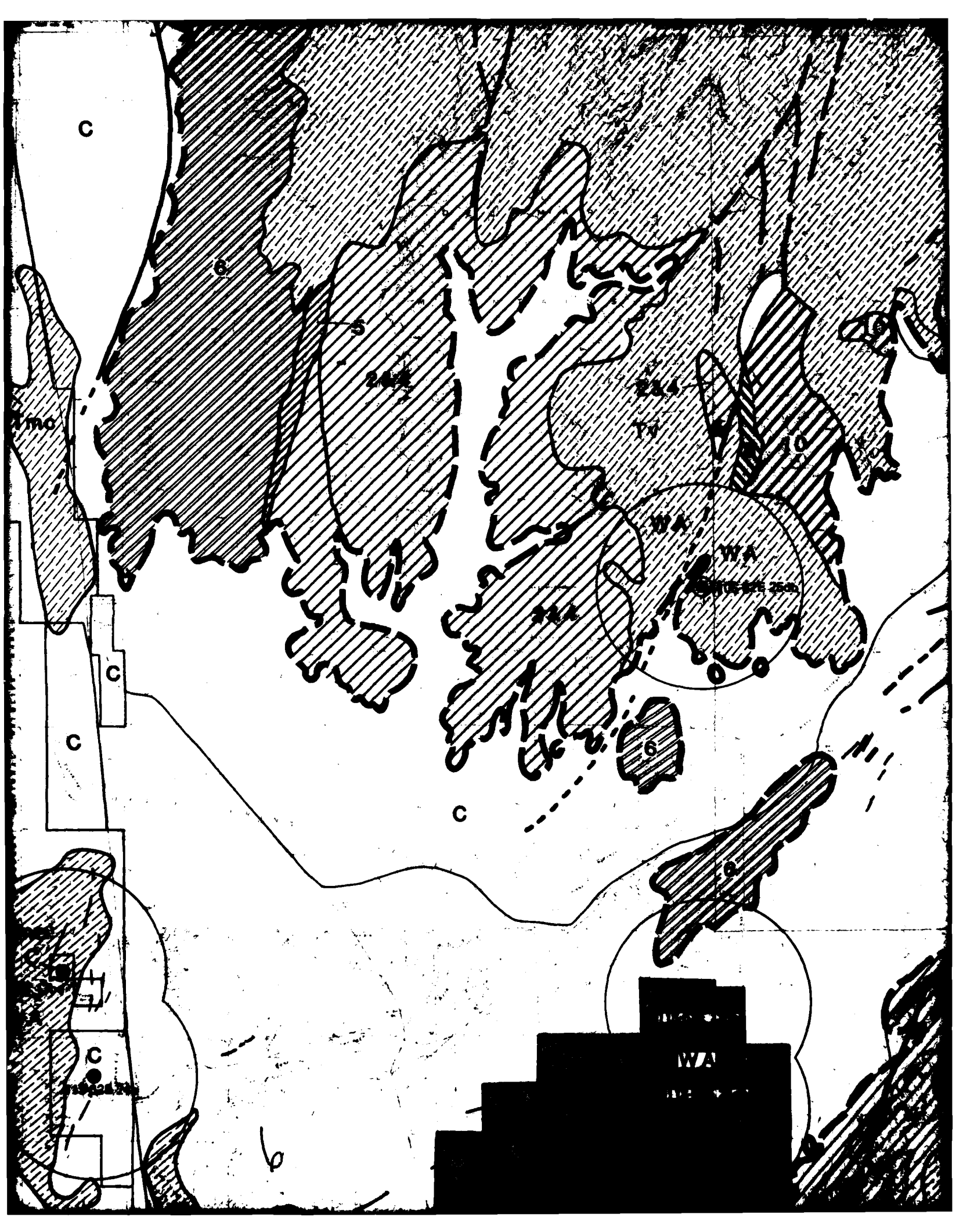
EVERGREEN

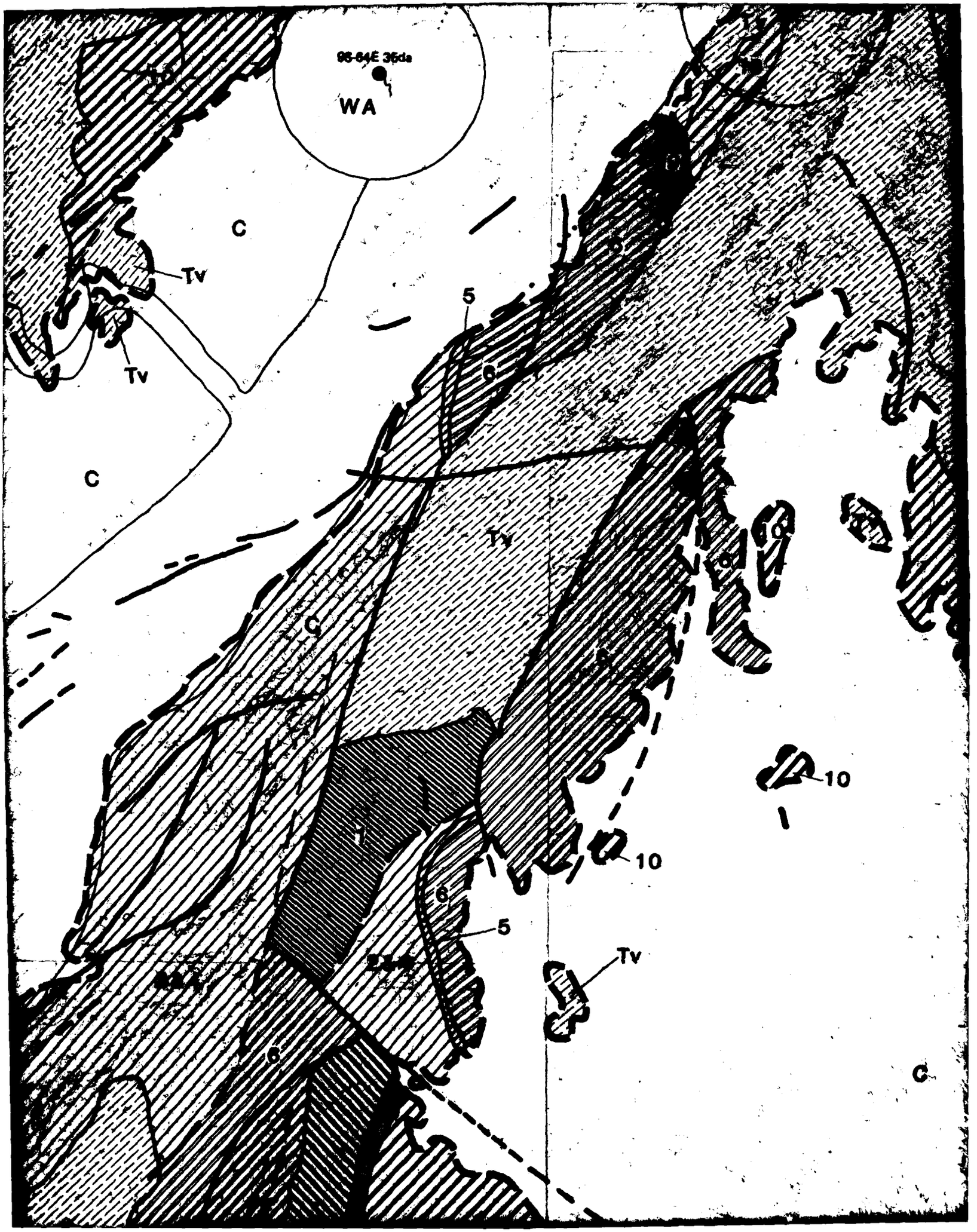

R 63 E
DELAMAR MOUNTAINS
BLM WILDERNESS
STUDY AREA

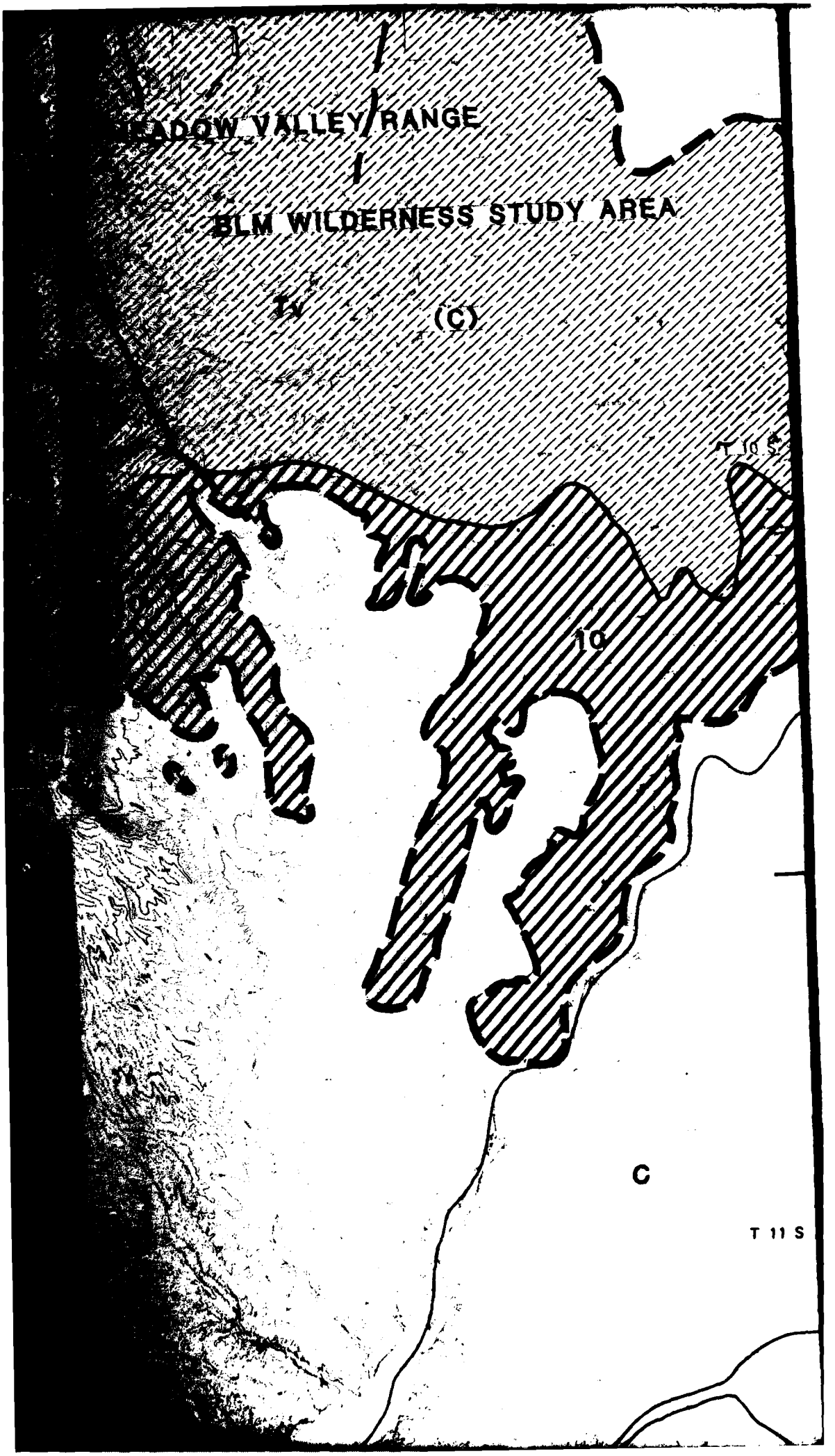

Tv
WA
WA
Tv
C
C
WA

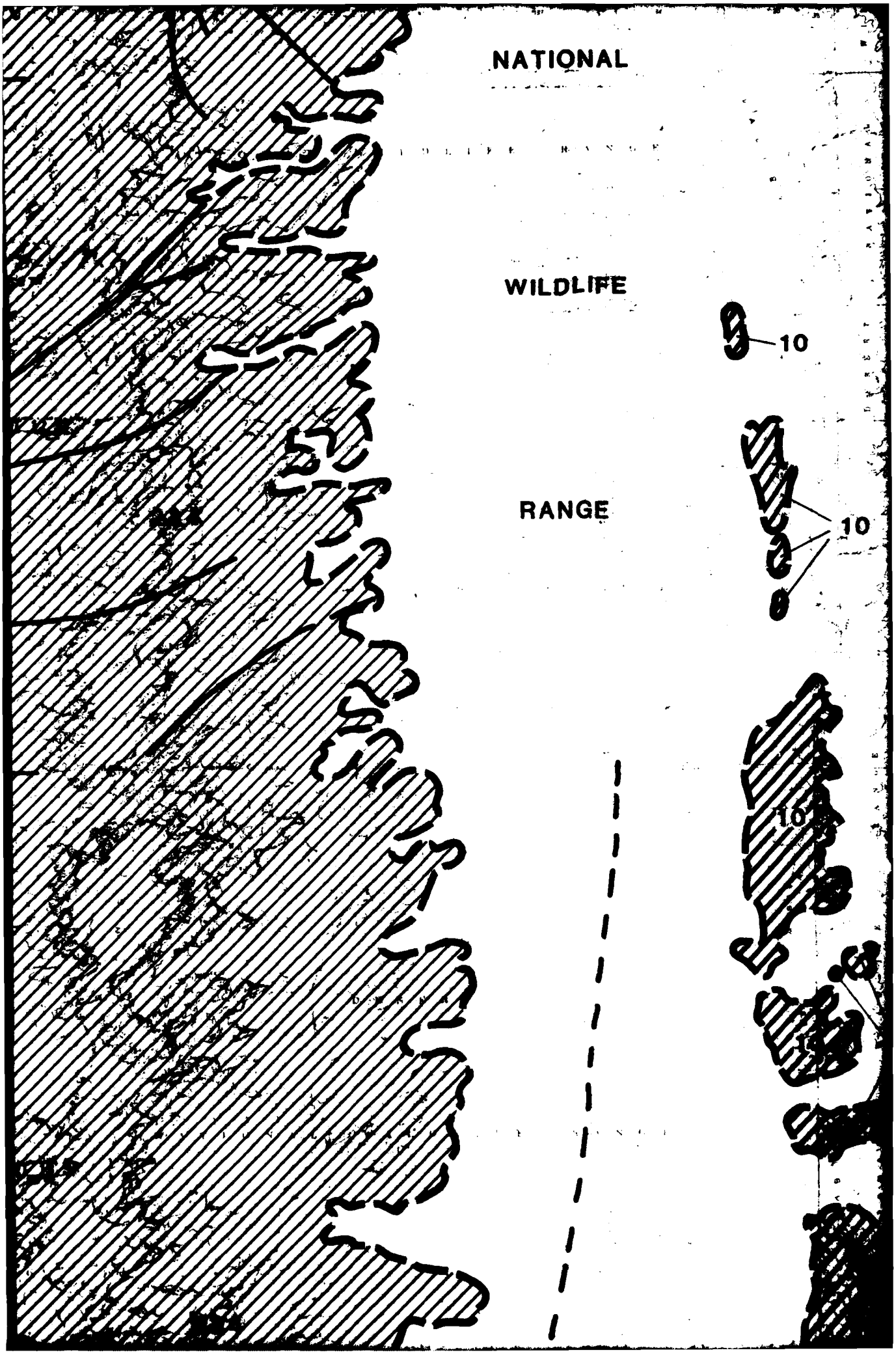

R 65 E
R 66 E
T 8 S
8S-65E 24cd
WA
C
C
C
WA
19

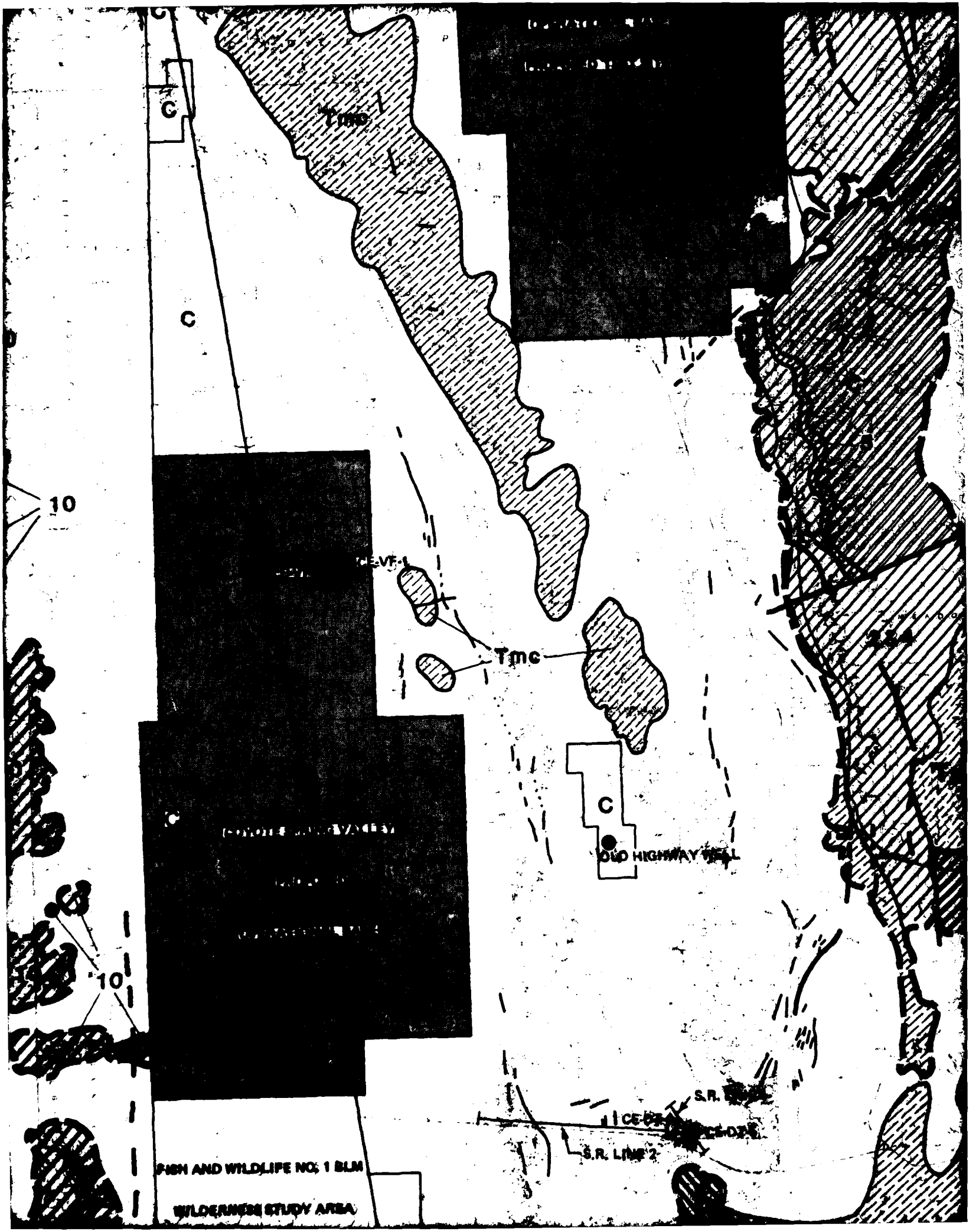

BLM WILDERNESS
STUDY AREA
C
C
C
Tmc
Jg
DESERT

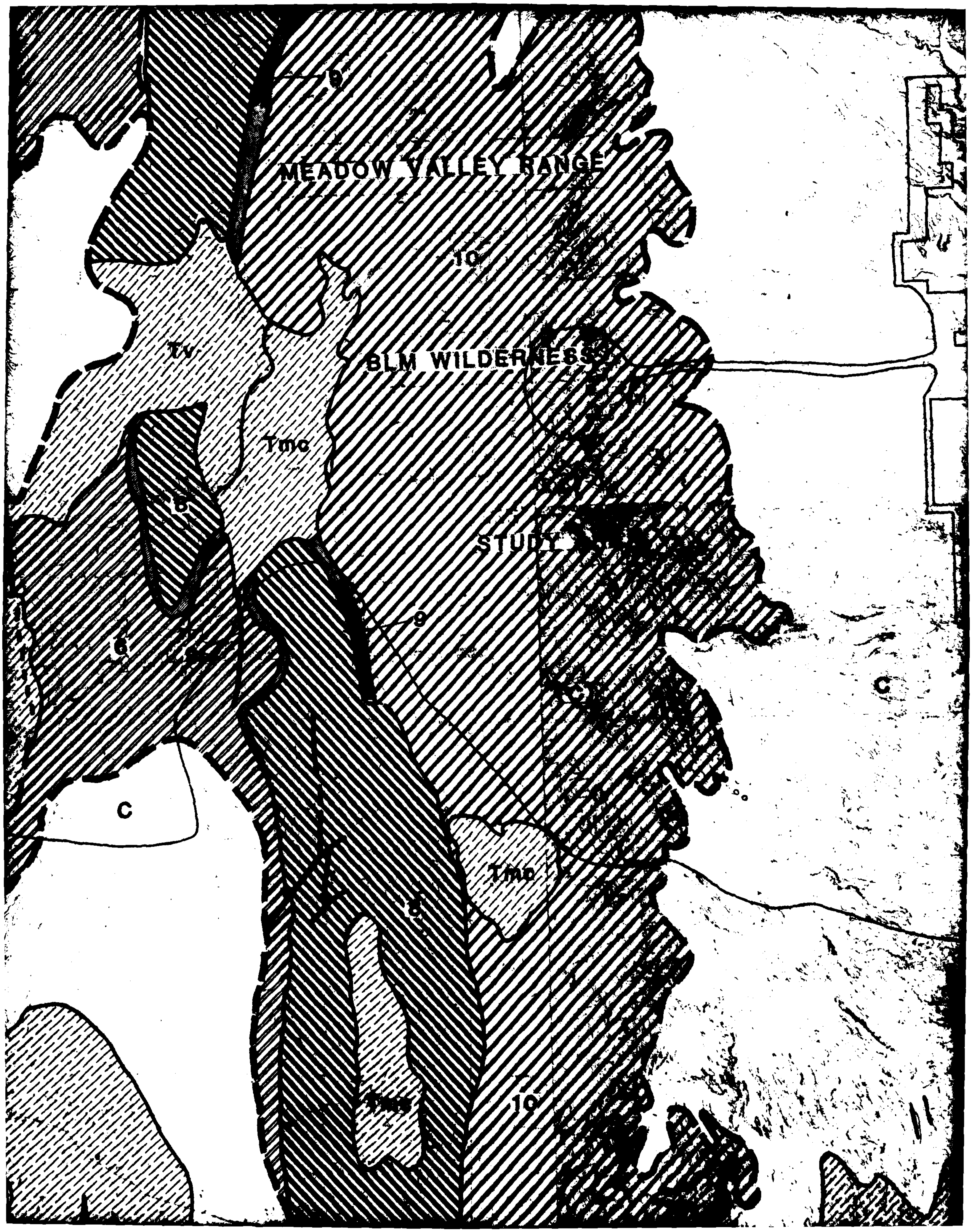

C
6
5
24
24
TV
10
WA
WA
C
C
C
6
6
C
WA


98-64E 36da
WA
C
Tv
Tv
5
6
C
Tv
C
10
10
6
5
Tv
6
C

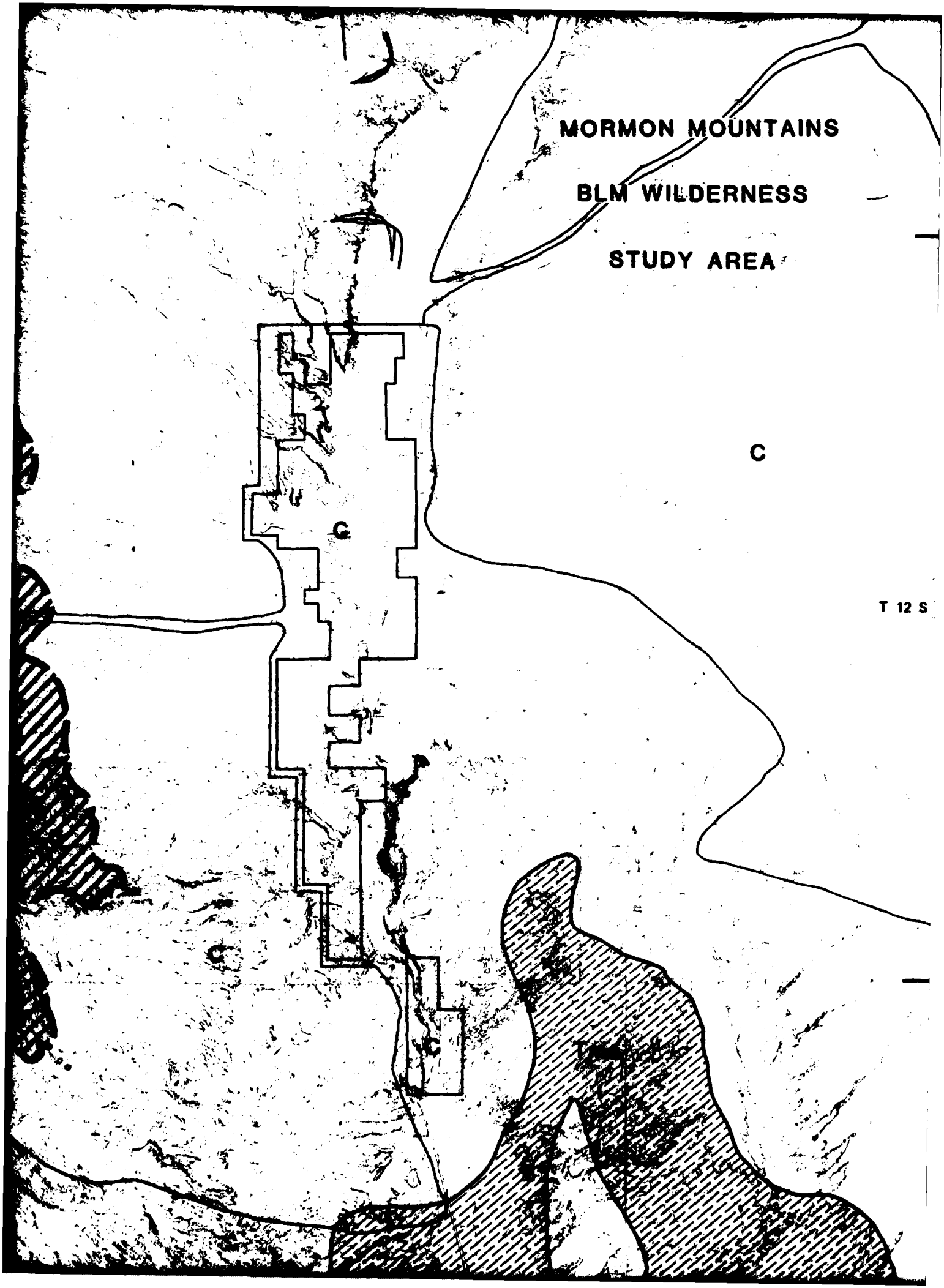

MEADOW VALLEY RANGE
BLM WILDERNESS STUDY AREA
(C)
T 10 S
10
C
T 11 S


NATIONAL
WILDLIFE
RANGE
10
10
16

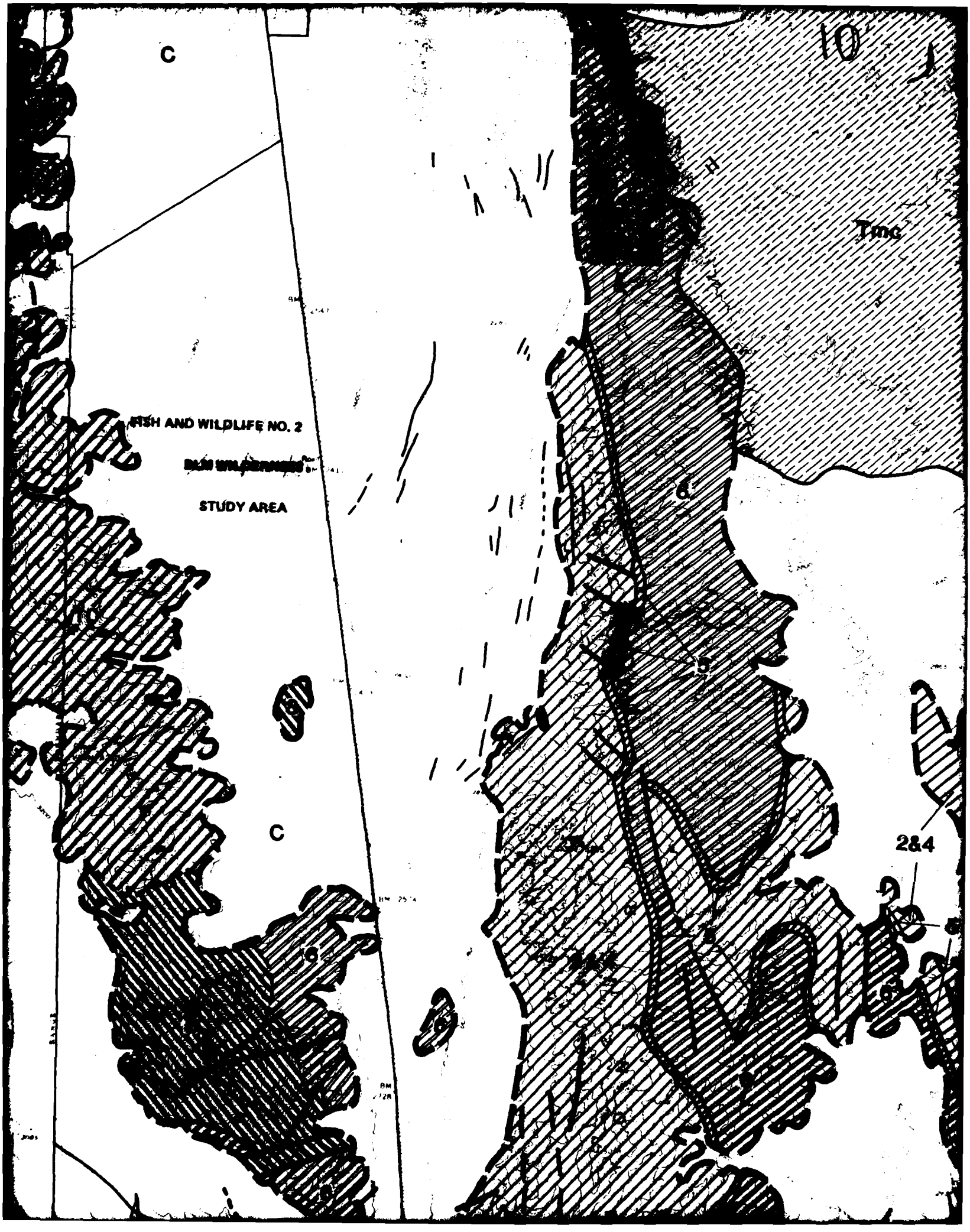

C
C
C
Tmc
Tmc
10
10
C
C
OLD HIGHWAY
S.R.
CE-02
S.R. LINE 2
FISH AND WILDLIFE NO. 1 BLM
WILDERNESS STUDY AREA

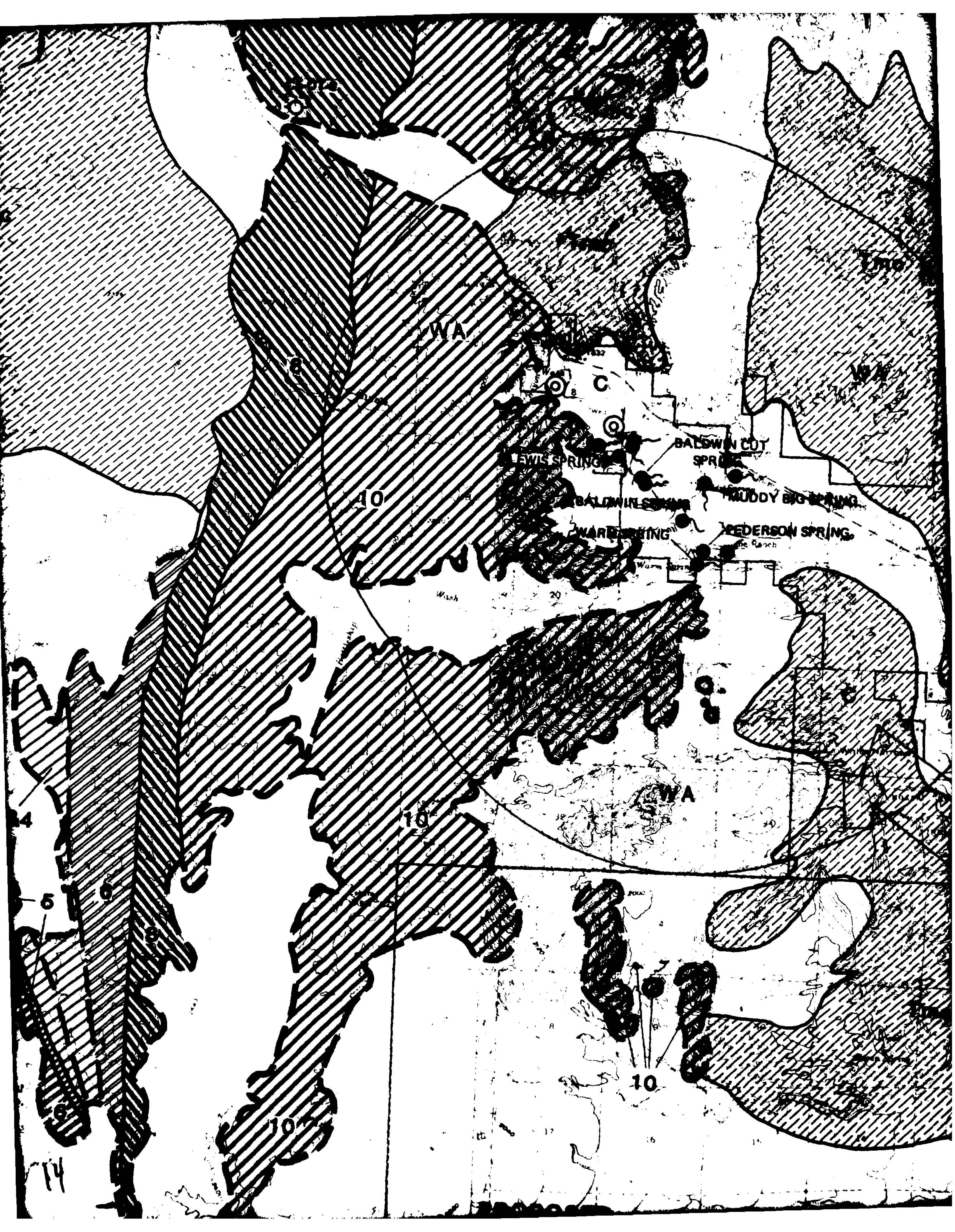


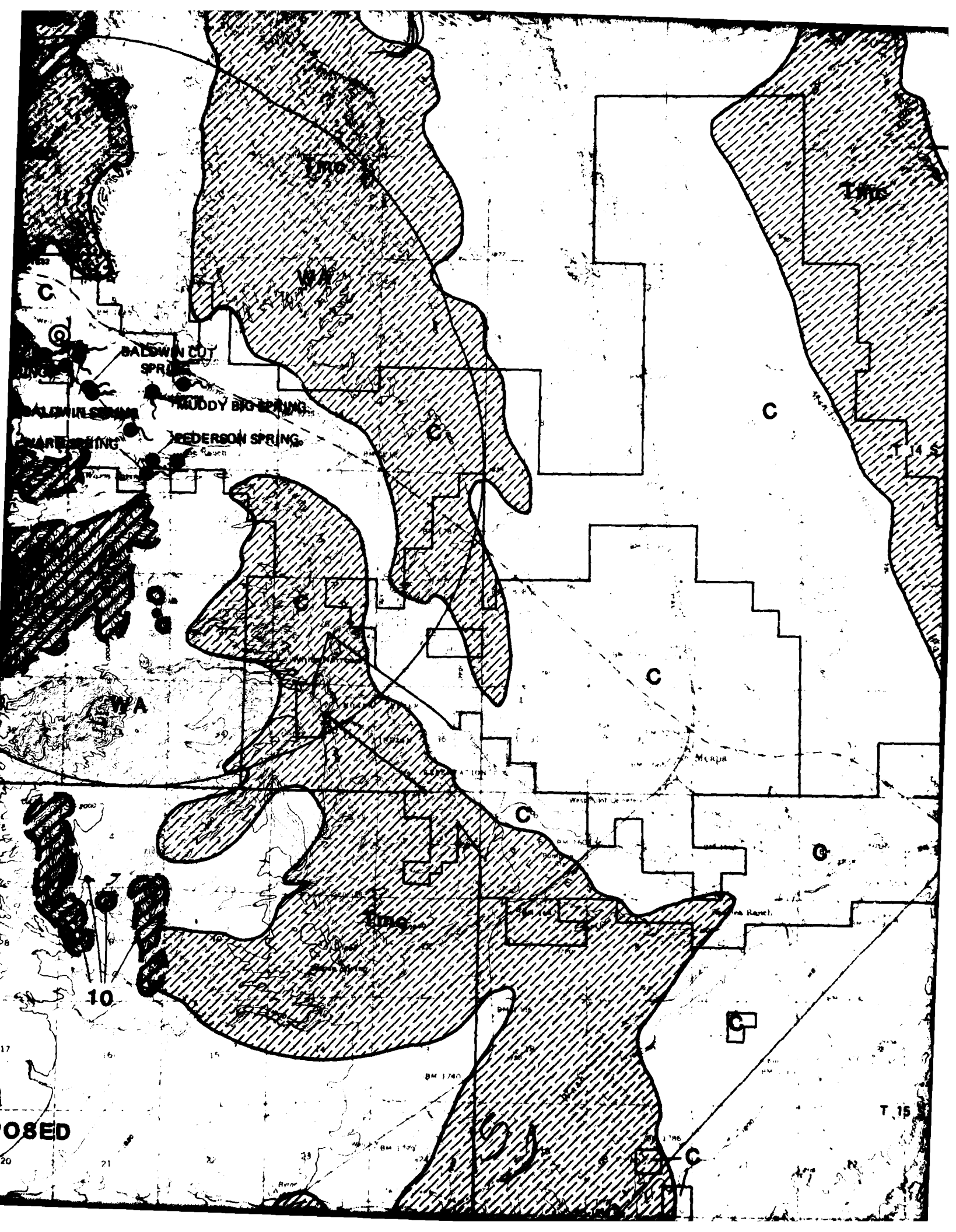
MEADOW VALLEY RANGE
BLM WILDERNESS
STUDY
9
10
Tv
Tmc
8
6
C
9
8
Tmc
10
C

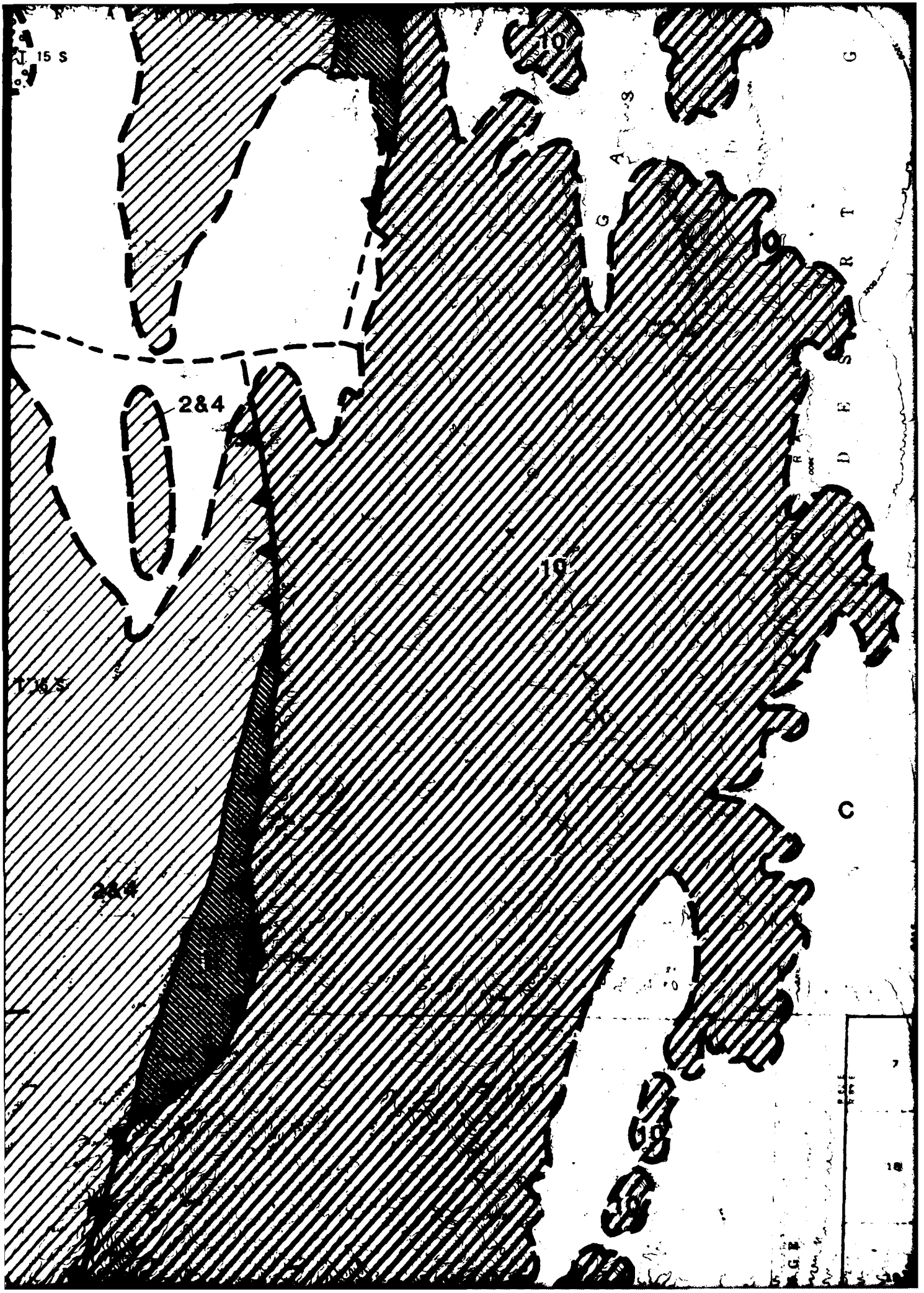

MORMON MOUNTAINS
BLM WILDERNESS
STUDY AREA
C
C
C
C
T 12 S

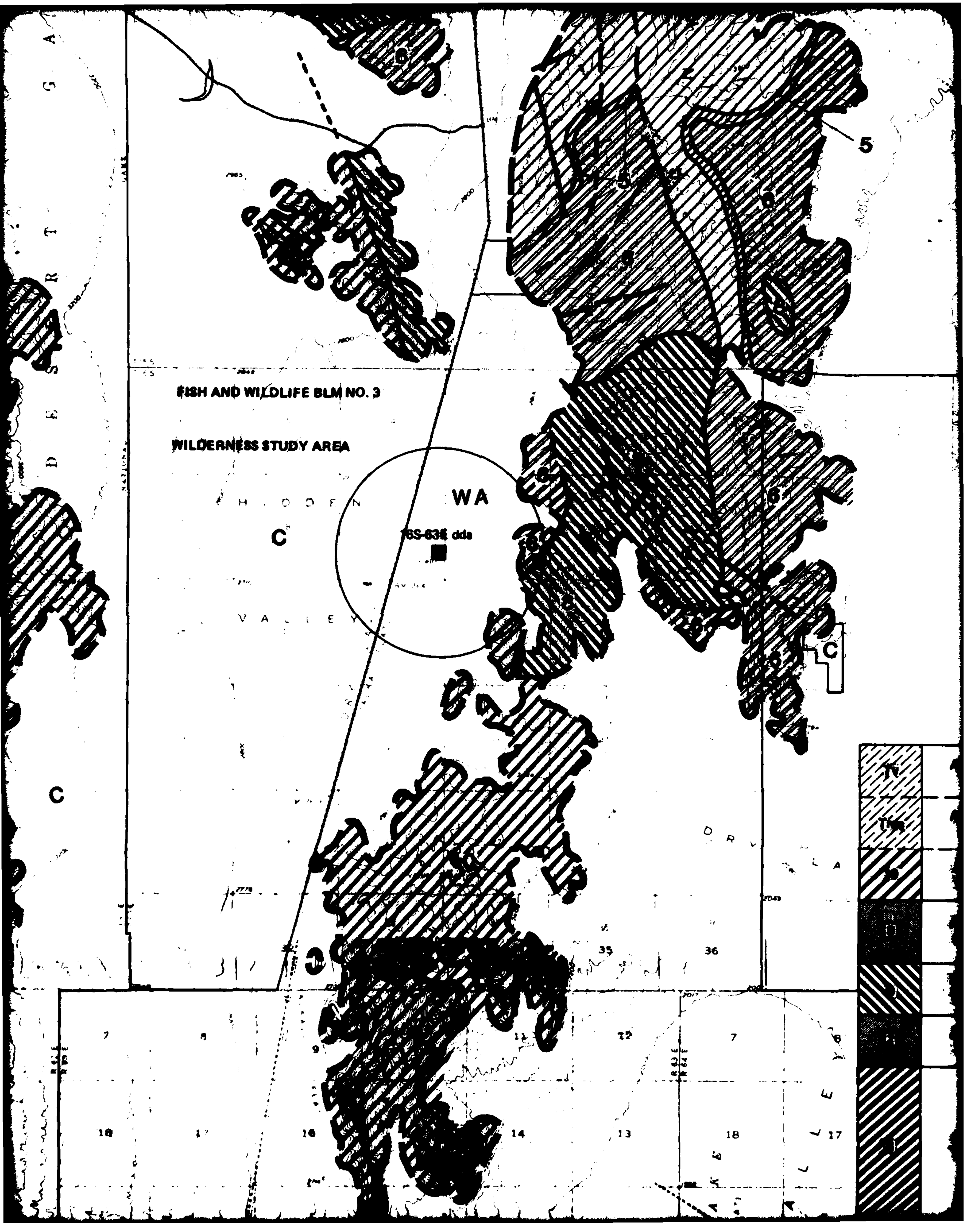

C
10
10
10
Elbow
RANGE

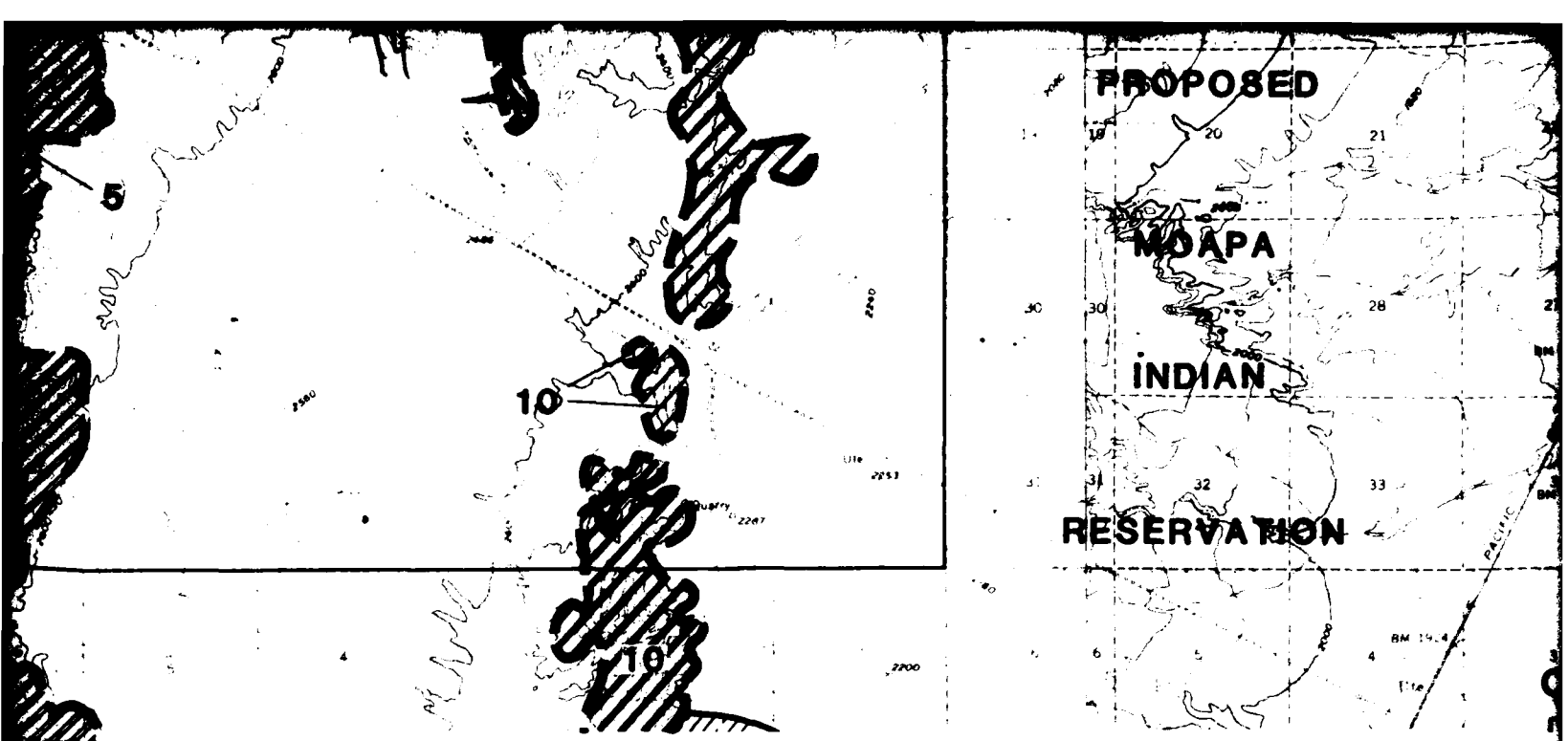

C
10
H
Tmc
ISH AND WILDLIFE NO. 2
STUDY AREA
6
5
C
2&4
6
BM


WA
8
C
BALDWIN CUT SPRING
LEWIS SPRING
10
BALDWIN SPRING
MUDDY BIG SPRING
WARM SPRING
PEDERSON SPRING
WA
10
6
6
8
5
10
10
14


BALDWIN COT SPRING
MUDDY BIG SPRING
REDERSON SPRING
T 14 S
T 15
10
C
WA


T 15 S
2&4
19
C


FISH AND WILDLIFE BLM NO. 3
WILDERNESS STUDY AREA
WA
16S-63E dda
H I D D E N
V A L L E Y
C
C
C
5
D R Y
L A K E
V A L L E Y
35
36
7
8
9
11
12
7
8
18
16
14
13
18
17



EXPLANATION

SYMBOLS

POWERLIN

TELEPHO

PIPELINE

ROCK–VA
DASHED

GEOLOG
WHERE

FAULTS
DASHED

THRUST
DASHED

FAULTS
DASHED

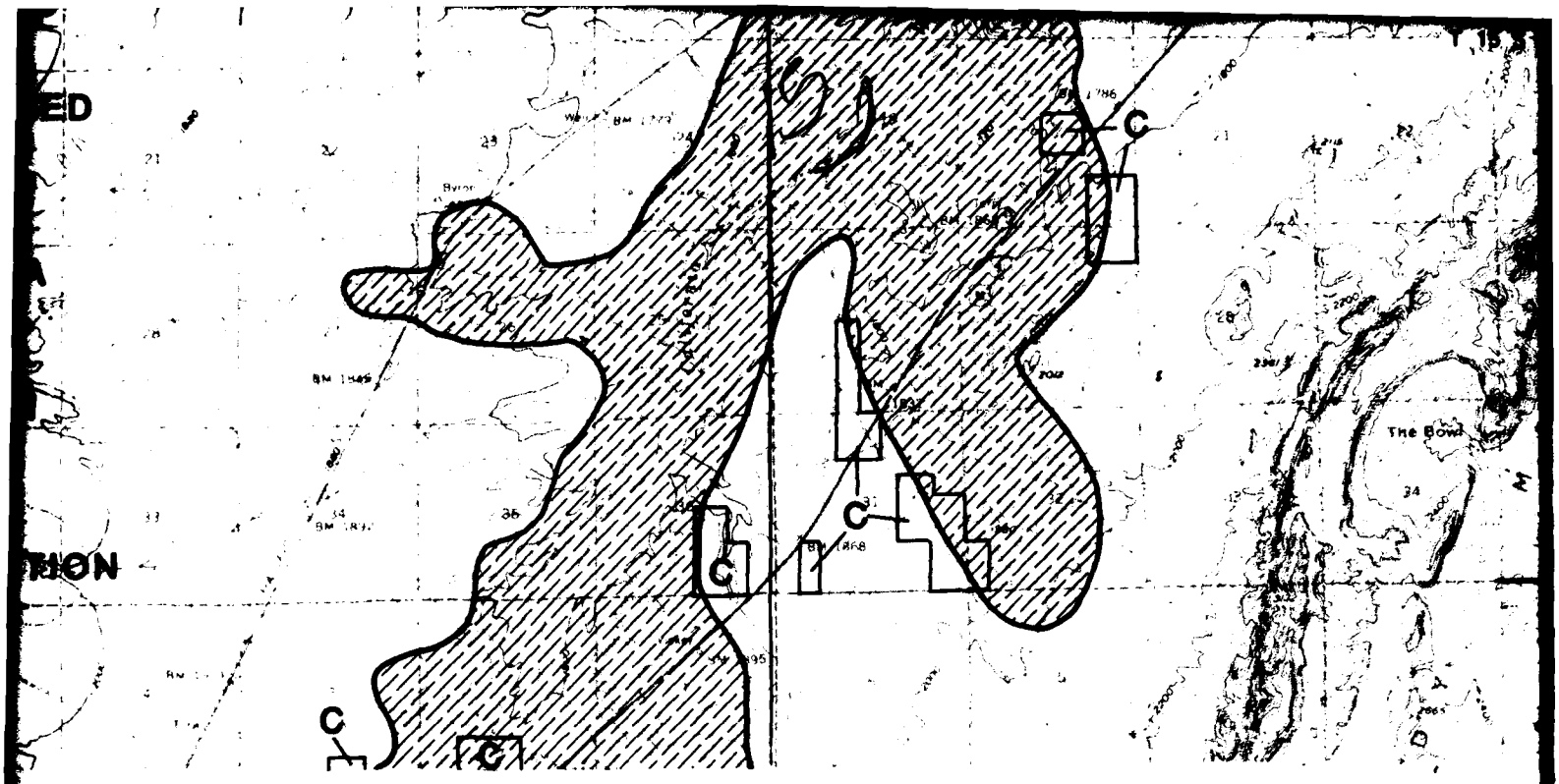
CULTUR
EXCLUS

SEISMIC

PROPOS
PROPOS

HYDROSTRATIGRAPHIC UNITS

Tv	AQUITARD Tv	VOLCANIC ROCKS UNDIFFERENTIATED	QUATERNARY
Tms	AQUITARD Tms	MUDDY CREEK FORMATION	TERTIARY
	AQUIFER NO. 10	BIRD SPRING FORMATION	PENNSYLVANIAN
	AQUITARD NO. 9	SCOTTY WASH QUARTZITE CHAINMAN SHALE	MISSISSIPPIAN
	AQUIFER NO. 8	MONTE CRISTO LIMESTONE	
	AQUITARD NO. 7	SILOT SHALE	DEVONIAN
	AQUIFER NO. 6	SULTAN LIMESTONE	
		LONE MOUNTAIN DOLOMITE	SILURIAN
		ELY SPRINGS DOLOMITE	



EXPLANATION

SYMBOLS

- POWERLINE(S)
- TELEPHONE/TELEGRAPH
- PIPELINE
- ROCK–VALLEY-FILL CONTACT, DASHED WHERE APPROXIMATE
- GEOLOGIC CONTACT, DASHED WHERE INFERRED
- FAULTS DELINEATED BY OTHERS, DASHED WHERE INFERRED
- THRUST FAULT DELINEATED BY OTHERS, DASHED WHERE INFERRED, BARBS ON UPPER PLATE
- FAULTS DELINEATED BY EARTEC WESTERN, INC., DASHED WHERE INFERRED
- CULTURAL OR WATER APPROPRIATION EXCLUSION BOUNDARY
- SEISMIC LINE*
- PROPOSED OPERATIONAL BASE AND PROPOSED OPERATIONAL BASE TEST SITE

- NEVADA POWER CO. MONITORING WELL
- AIR FORCE OBSERVATION WELL
- AIR FORCE TEST WELL
- DOMESTIC/STOCK WELL
- MUNICIPAL/IRRIGATION WELL
- UNDESIGNATED WELL
- SPRING
- RESERVOIR

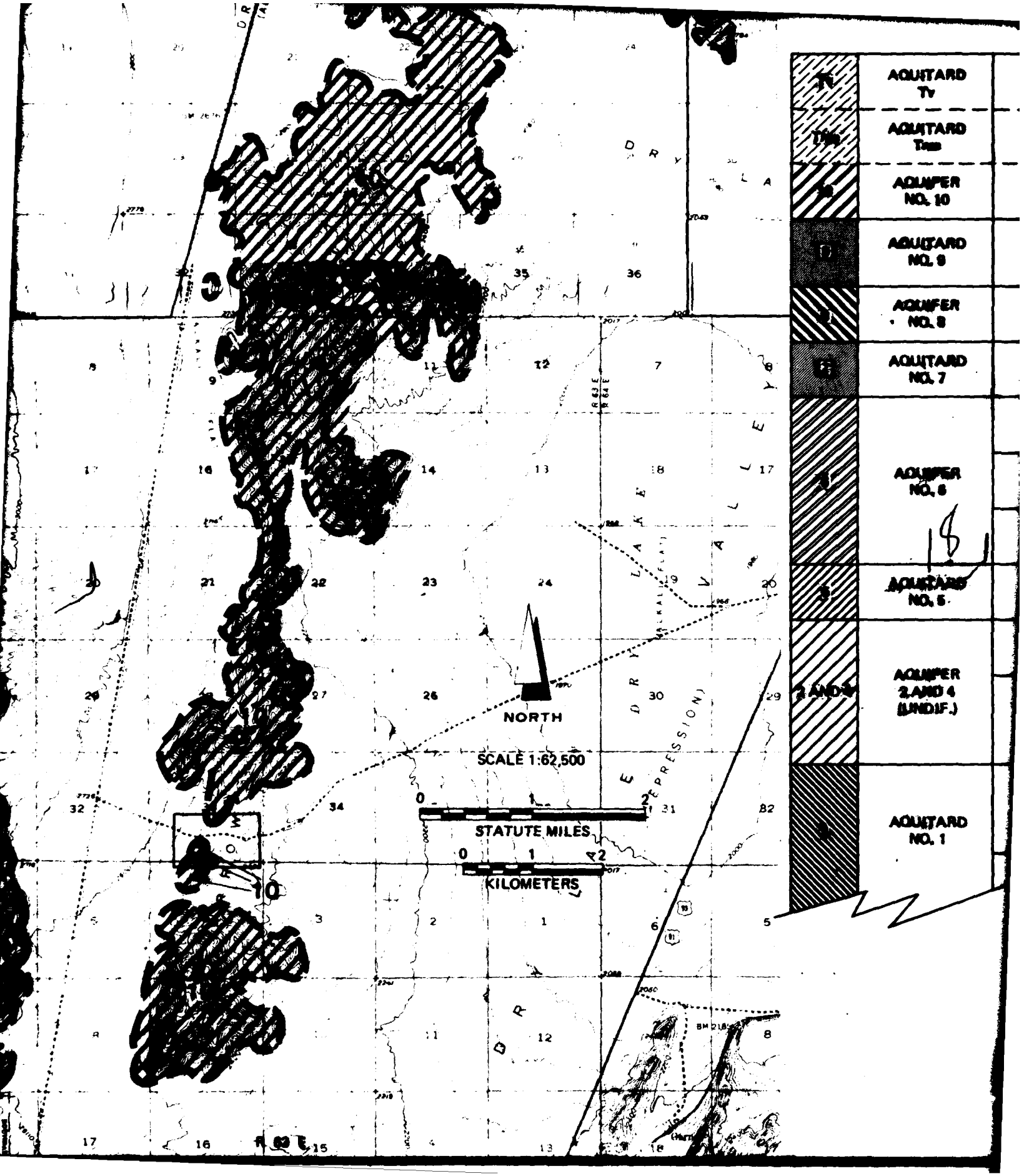
REFERENCES

EDAW, Inc., 1981, MX Operational Base studies DOPAA deliverable number 4, 21 August 1981.

Ertec Western, Inc., 1981, MX siting investigation, water resources program, Operational Base studies report – Volume I, Coyote Spring Operational Base, Nevada, E-TR-81-4, 29 May 1981.

Ertec Western Inc., 1981, MX Operational Base studies – 0878, DOPAA deliverable number 4, 21 August 1981.

C
C
GAME RANGE
10


AQUITARD Tv
AQUITARD Tma
AQUIFER NO. 10
AQUITARD NO. 9
AQUIFER NO. 8
AQUITARD NO. 7
AQUIFER NO. 6
AQUITARD NO. 5
AQUIFER 2 AND 4 (UNDIF.)
AQUITARD NO. 1
NORTH
SCALE 1:62,500
STATUTE MILES
KILOMETERS
DRY LAKE VALLEY
DRY LAKE VALLEY (DEPRESSION)

HYDROSTRATIGRAPHIC UNITS

Tv	AQUITARD Tv	VOLCANIC ROCKS UNDIFFERENTIATED	QUATERNARY
Tms	AQUITARD Tms	MUDDY CREEK FORMATION	TERTIARY
10	AQUIFER NO. 10	BIRD SPRING FORMATION	PENNSYLVANIAN
9	AQUITARD NO. 9	SCOTTY WASH QUARTZITE CHAINMAN SHALE	MISSISSIPPIAN
8	AQUIFER NO. 8	MONTE CRISTO LIMESTONE	
7	AQUITARD NO. 7	PILOT SHALE	DEVONIAN
	AQUIFER NO. 6	SULTAN LIMESTONE	
6		LONE MOUNTAIN DOLOMITE	SILURIAN
		ELY SPRINGS DOLOMITE	
5	AQUITARD NO. 5	EUREKA QUARTZITE	ORDOVICIAN
2 AND 4	AQUIFER 2 AND 4 (UNDIF.)	POGONIP GROUP	
		MIDDLE AND UPPER CAMBRIAN LIMESTONE AND DOLOMITE	CAMBRIAN
1	AQUITARD NO. 1	CHISHOLM SHALE BIOCHE SHALE PROSPECT MOUNTAIN QUARTZITE	
		PRECAMBRIAN CLASTIC ROCKS	pC

PIPELINE

ROCK–VALL… DASHED WHE…

GEOLOGIC CO… WHERE INFE…

FAULTS DE… DASHED WHE…

THRUST FAU… DASHED WHE…

FAULTS DE… DASHED WHE…

CULTURAL C… EXCLUSION …

SEISMIC LINE…

PROPOSED C… PROPOSED C…

* SEISMIC PROFILE SHOWN…

AREAS OF …

WA : WATER APPROPRIA… FROM EXISTING W… WATER RIGHTS

C : CULTURAL

ROCK–VALLEY-FILL CONTACT, DASHED WHERE APPROXIMATE

GEOLOGIC CONTACT, DASHED WHERE INFERRED

FAULTS DELINEATED BY OTHERS, DASHED WHERE INFERRED

THRUST FAULT DELINEATED BY OTHERS, DASHED WHERE INFERRED. BARBS ON UPPER PLATE

FAULTS DELINEATED BY ERTEC WESTERN, INC., DASHED WHERE INFERRED

CULTURAL OR WATER APPROPRIATION EXCLUSION BOUNDARY

SEISMIC LINE*

PROPOSED OPERATIONAL BASE AND PROPOSED OPERATIONAL BASE TEST SITE

DOMESTIC/STOCK WELL

MUNICIPAL/IRRIGATION WELL

UNDESIGNATED WELL

SPRING

RESERVOIR

19

* SEISMIC PROFILE SHOWN IN APPENDIX A1-1

AREAS OF EXCLUSION

WA : WATER APPROPRIATION; 1-MILE RADIUS FROM EXISTING WELLS, SPRINGS, AND WATER RIGHTS

C : CULTURAL

REFERENCES

EDAW, Inc., 1981, MX Operational Base studies DOPAA deliverable number 4, 21 August 1981.

Ertec Western, Inc., 1981, MX siting investigation, water resources program, Operational Base studies report – Volume I, Coyote Spring Operational Base, Nevada, E-TR-51-I, 28 May 1981.

Ertec Western Inc., 1981, MX Operational Base studies – OBTS, DOPAA deliverable number 4, 21 August 1981.

Fugro National, Inc., 1980, MX siting investigation, Operational Base site, Coyote Spring Valley, Nevada, PN-TR-43, 28 December 1980.

Longwell, C.R., Pampeyan, E.H., Bowyer, and Roberts, R.J., 1965, Geology and mineral deposits of Clark County, Nevada, Nevada Bureau of Mines Bulletin 62.

Tschanz, C.M., and Pampeyan, E.H., 1970, Geology and mineral deposits of Lincoln County, Nevada, Nevada Bureau of Mines Bulletin 73.

Ertec
The Earth Technology Corporation

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE
BMO/AFRCE-MX

COYOTE SPRING VALLEY, NEVADA HYDROGEOLOGIC MAP

30 NOV 81

PD Number 1